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. . . by applying a tinted masking compound recently developed, you can solve the annoying and slow process of removing a baked insulating varnish from certain motor parts on which no finish should finally appear.

. . . a solvent-proof, rubber-like transparent tubing is finding new uses in the metal finishing field. It is not affected by even such active solvents as carbon disulphide, carbon tetrachloride, trichorethylene, perchlorethylene, acetylene tetrachloride, benzol, and toluol.

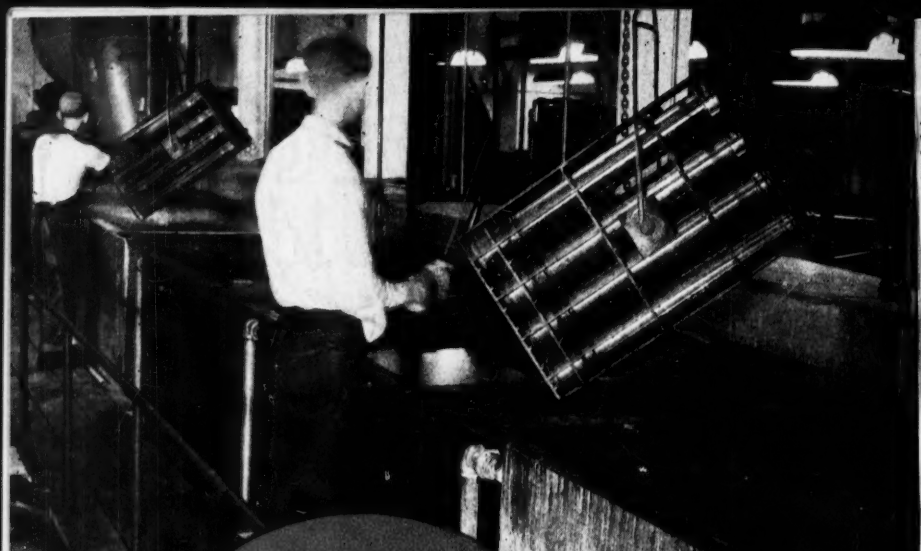
. . . electrostatic spraying equipment is being adopted in the field of porcelain enameling and, according to one manufacturer, is said to promise a greater degree of efficiency.

. . . a new basic resin that is made from waste agricultural products, such as oat hulls and corn cobs, is said to provide a protective coating for laboratory furniture, table tops, dry cleaning, or vapor degreasing equipment or other equipment exposed to hot solvent fumes or excessive moisture.

. . . deposition of "blue" chromium, thought to be due to the formation of blue perchromic acid (H_7CrO_{10}) in freshly prepared baths, can be prevented by wiping the plated article with ether.

. . . a method has been developed for electrodepositing a continuous mirror-like layer of 90 to 100 scleroscope hardness tin on black iron. The layer of tin is claimed to be homogeneous and malleable.

. . . cadmium and cadmium plate can be given a brown color by a 2 to 8-minute dip in a solution of 7.5 g./l. $K_2Cr_2O_7$ and 3.8 HNO_3 (36 deg. Be.), temperature 60 to 75 degrees.



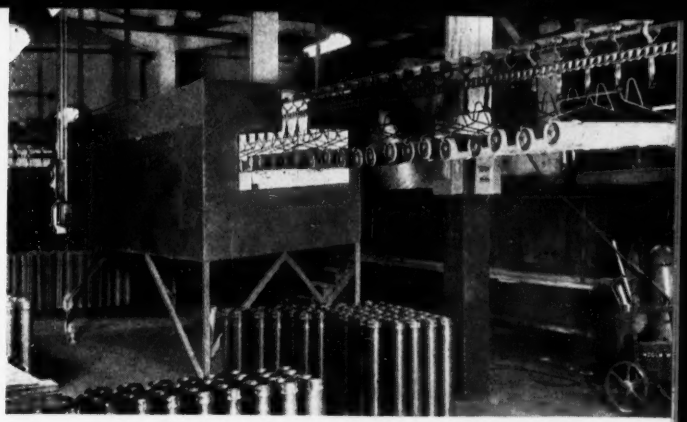
Finishing Metal Containers for .75 Millimeter Shells

By J. E. SUMP
Gen. Mgr., Jensen Specialties, Inc.,
Detroit, Michigan

EXPERIENCE indicated that cardboard containers housing .75 mm. shells absorbed a considerable amount of moisture while being shipped overseas. Salt corrosion caused a high mortality—made a high percentage of the containers unusable.

The Government, faced with the need for a container which would withstand 250 hours of salt spray test, called upon industry for assistance. Thirty plants throughout the country expressed their eagerness to help. Among the participants was the Gunn Furniture Co., Grand Rapids, Mich.,

The above illustration shows the manner in which metal containers for .75 mm. shells are cleaned and bonderized prior to paint dipping.



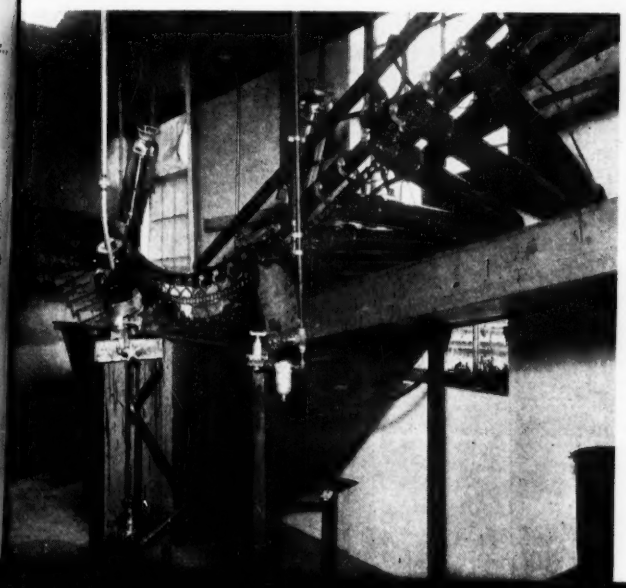
After cleaning and bonderizing, the containers are dried off by conveying through the 13-foot long drying-off oven illustrated herewith.

which firm called in representatives of Jensen Specialties, Inc., of Detroit, to engineer equipment for conveying, dipping, and baking paint on the inside and outside of metal type containers for .75 mm. shells.

Through the use of the equipment subsequently installed, the containers are cleaned and bonderized, then dried off by conveying through an oven employing one hundred and twelve 250-watt Wabash RE/40 silvered heat lamps. The first ten lamps in each row are located on 7-inch centers, whereas the last six lamps are positioned on 10½-inch centers. The bottom of the oven consists of four rows of lamps, while the top of the oven consists of two rows of lamps.

After being thoroughly dried in the oven, the containers are conveyed through an automatic paint dip tank. A special "jiggling" device fastened to the conveyor assures full coverage of the paint on the inside of each container. The specially designed hooks of the conveyor carry the containers through the dry-off oven and paint tank at an angle of 5 degrees. This angle permits the paint to drip from the closed end of each container for 90 seconds.

Due to a unique tripping device, also attached to the conveyor, the containers change their position from an angle of 5 deg. one way to 45 deg. the other way as they emerge from the paint dip tank. This completely automatic tripping operation per-



In this illustration, the containers are shown being conveyed through tank for automatic paint dipping.

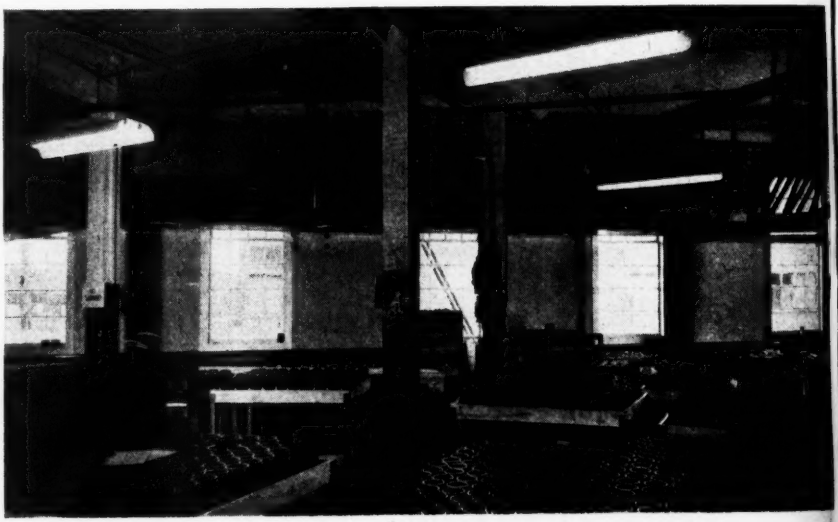
An automatic tripping device attached to conveyor provides for change in the position of containers from angle of 5 deg. one way to 45 deg. the other way as they emerge from automatic paint dip tank to allow for draining of paint from inside the containers.

mits the paint to drain from inside of each container for a period of eight minutes before the containers are passed into a ceiling-mounted infra-red oven for baking on finish.

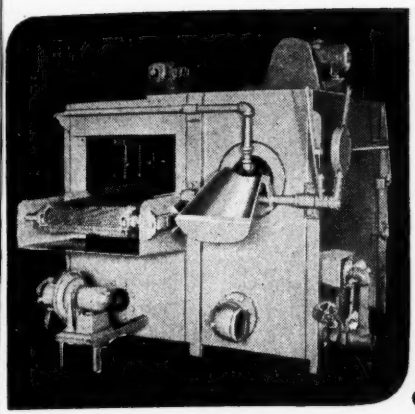
The paint baking oven, which is 30 feet long, contains seven rows of 250-watt RE/40 Wabash lamps or a total of 250 lamps. The first 22 lamps are on 7-inch centers, and the last 14 on 10½-inch centers followed by 59 inches of sheet metal enclosure. The baking cycle covers nine minutes.

Upon emerging from the baking oven, the finished parts are conveyed to convenient position for unloading.

The equipment used in conveying



The painted containers now pass into the 30-foot ceiling-mounted infra-red oven shown here for baking on finish.



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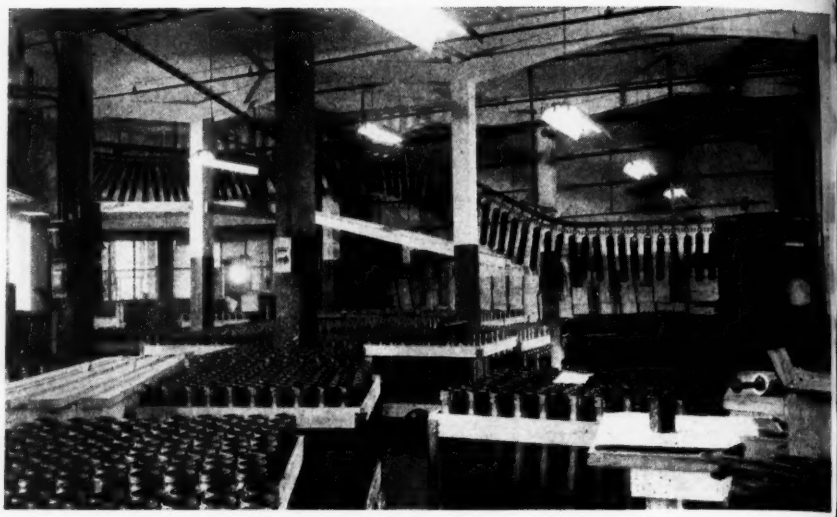

Upon leaving the paint baking oven, the finished containers are conveyed to unloading position by means of unusual 196-foot long conveyor illustrated herein.

the containers through the various phases of the finishing process comprises a Jensen "Loop-Around" conveyor, 196 feet long. The hooks of the conveyor are on 6½-inch centers, with trolleys every 13 inches apart. The chain consists of malleable iron links and steel pins which require no grease, thus eliminating the possibility of grease melting while passing through the heat zone and falling on painted parts being processed.

Music at Work. A report on what management, labor, science and government think of "functional" music has been published in booklet form under the title "Muzak at Work" and is available on request from Muzak Corp., 229 Fourth Ave., New York, New York.

The opinions of management and labor are the result of actual surveys made in specific industries. The scientific data measuring actual production in factories before and after music was installed grew out of a survey made by Professor Harold Burris-Meyer and Richmond L. Cardinell of Stevens Institute of Technology. The government report is based on a nation-wide survey of music in war plants made by Wheeler Beckett of the War Production Drive of the WPB, Washington, D. C.

In addition to excerpts from the reports, the booklet contains a description of Muzak facilities and service. This data covers 10 years of research and experience in the specialized field of providing programmed music for work, relaxation, and entertainment in diversified business fields coast of coast. It explains why music must be especially played and especially programmed to have maximum effectiveness under different conditions of use. Copy free upon request.

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The Chemistry of Electroplating

By Dr. C. B. F. Young, Consultant

Part 12

IN the last article the phosphorous and alkaline earth families, aluminum and silicon were studied. In the present one, first a transition group composed of iron and cobalt and nickel is treated. Next, two families are studied; zinc, cadmium and mercury compose most of one family, while tin and lead are the other family.

Iron, cobalt, and nickel do not compose necessarily a family, but are transition elements, which lie between the first and second octaves of the periodic system. Iron resembles chromium and manganese in some respects while nickel is somewhat similar to copper and zinc. All the metals of this family are magnetic, their order being as follows: iron first, cobalt second, and nickel last. Of this group iron is the most important.

The most important iron ores are the oxides, haematite, Fe_2O_3, and magnetite, Fe_3O_4. The carbonate Siderite, $FeCO_3$, is also known. Pyrite, FeS_2, is used on account of its sulfur content in the manufacture of sulfuric acid. This material, because of its golden yellow shining cubes is known as fool's gold.

In order to obtain iron from the oxides it is necessary to liberate the element with some reducing agent. Generally, coke is used for this purpose. The coke burns to form carbon monoxide and this, in turn, reduces the iron.

$$2C + O_2 = 2CO$$

The equipment used to reduce iron ore is known as a blast furnace, and is generally 50-100 feet high, cylindrical in shape, constructed with steel and lined with fire brick. Inlets at the bottom of the furnace deliver hot compressed air to the stack. The ore, coke, and the materials which will form a fusible slag, such as limestone, are introduced at the top of the furnace. The reduction is continued as the solid material increases in temperature through combustion of the coke. In the bottom, melted iron and slag will form in two layers. The slag, being much lighter than the iron, floats on top and is withdrawn at definite intervals. The iron in the molten state is withdrawn from the lower tap. The carbon monoxide, which is formed, unites with the ore as follows:

$$Fe_2O_3 + 3CO = 3CO_2 + 2Fe$$

The iron produced in this furnace contains many impurities such as sil-

ica, sulfur, phosphorous, and carbon, and is known as pig iron. This contains about 94 per cent iron with about 2.5-4.3 per cent carbon, also silicon, manganese, phosphorus and sulfur. This material is used in making castings, stoves, pipes, radiators, furnace grates, and so on. One of its unique properties is that on becoming solid it expands and therefore fills every part of a mold, which is ideal for casting. The material can be obtained in two forms, one a very hard and very brittle product, which is obtained by chilling the iron quickly. The carbon combines with the iron as cementite, Fe_3C. This material is rather white as compared with the other type which is known as gray cast iron. This mixture is much softer because the cementite which is present decomposes and the iron is in the pure state, while the carbon is in the form of graphite.

Wrought iron is made by heating pig iron which is placed upon a layer of material containing iron oxide and hammar slag. The latter material is basic silicate of iron. The heating takes place in a reverbatory furnace. The flame and heat is generated in one compartment and deflected by the low roof on the material to be heated. The phosphorus, silicon, and carbon present as an impurity in the iron combine with the oxygen of the oxide and dissolve in the slag present. The sulfur unites with the iron to form ferrous sulfide and also passes into the slag. As the iron becomes free from impurities, it passes from the liquid into an almost semi-solid state. This operation produces a very good grade of iron, being around 99.85 per cent, but is rather expensive to produce. The Bessemer and Open Hearth products have displaced this type iron.

Steel contains carbon in different amounts but is free from phosphorous, silicon, and sulfur. The amount of carbon will depend upon the use of the material. Structural steel contains around 0.4 per cent while tool steel contains up to 1.5 per cent. This material can be magnetized, tempered and has a high tensile strength.

Considerable steel is made by the Bessemer Process. This consists of pouring the molten cast iron into an egg shaped converter which is made of steel and lined with sand and clay, and has openings at the bottom which permit the passage of air into the melt. The oxidation of some iron and the impurities, which are manganese, silicon, and carbon, generates a high temperature. When the reaction is complete the desired amount of carbon is added and the material is discharged.

Many times Bessemer steel is not desirable as it does not remove the phosphorus. This may be removed in an Open Hearth furnace which contains a wide, shallow bed with a low roof. The lining is composed of lime and magnesia for the basic and sand for the acid process. The fuel used is generally gas. The gas and air are both preheated before entering the furnace proper. This process will remove carbon, sulfur, silicon, and also phosphorus. The steel produced is used for rails and other high grade products.

In quite a few instances electric current is taking the place of carbon for heating by using an electric furnace. This is especially true in the production of alloy steels. The electric furnace permits a more careful adjustment of conditions in the manufacture of steel products than either the Open Hearth or Bessemer furnaces. Oxidation or reduction can be carried to any point desired. Sulfur and phosphorous can be eliminated until only traces remain. As a general rule higher temperatures, closer control, and better working conditions are obtained with an electric furnace.

but the cost is higher than with the other types.

For special purposes, a very poor open hearth steel is remelted with charcoal or pig iron in graphite or clay crucibles. This is known as crucible steel and is employed in making dies, cutlery, and razors.

If steel is heated above 900 deg. C., the carbon unites chemically with the iron to form cementite, Fe_3C. If cooled very quickly, the cementite does not have a chance to be precipitated out of solution but remains in the steel making it quite hard. However, if the iron is cooled rather slowly, cementite crystals separate at around 700 deg. C. and produces a softer and tougher iron. This is known as tempering. By first chilling a piece of iron and then heating it up and cooling slowly many variations of tempering can be obtained.

There are many alloys of steel. They are many times stronger and are more resistant to corrosion. Steel, with 2-4 per cent nickel, resists corrosion and is very hard. With 36 per cent nickel the alloy is called invar and is practically non-expansive when heated. This material is used for pendelum rods, and so on. Duriron contains about 15 per cent silicon and is insoluble in sulfuric, nitric, or acetic acid, and is used in the chemical industry for acid containers. Manganese steel contains 12-14 per cent manganese, is a very hard alloy, and does not lose its temper when heated by friction. It is used for the jaws of rock crushing machinery.

Chromium vanadium steel, which contains 1 per cent chromium, 0.15 per cent vanadium, has great tensile strength, and is used for axles and connecting rods on automobiles.

Tungsten steel contains 8-20 per cent tungsten and 3-5 per cent chromium and is used for high speed tool material as it can become red hot from friction without losing its temper.

Case hardened steel is steel which has been heated in contact with powdered carbon. The carbon tends to unite with the surface iron and produces a hard steel over a body of softer material. Therefore, the material has a hard exterior and a soft, tough interior.

Nitrided steel is similar to case hardened steel except that nitrogen is the hardening agent. The hot metal absorbs the nitrogen from ammonia and other nitrogen compounds and forms nitrides of iron on the surface. This produces a material which has a very hard surface with a soft interior.

Stainless steel, an alloy containing 18 per cent chromium, 8 per cent nickel, and 0.2 per cent carbon, has remarkable corrosion resisting properties. It is known under various trade marks. The general name for the alloy is stainless steel.

There are many iron compounds. Iron with a valence of two produces ferrous compounds. Ferrous sulfide, FeS, can be prepared by heating iron and sulfur together. It reacts with acids producing H_2S—a valuable laboratory tool which is used by the chemist in analyzing compounds.

$$2HCl + FeS = FeCl_2 + H_2S$$

Ferrous sulfate is obtained by oxidizing pyrites in the air and leaching the resulting materials.

$$2FeS_2 + 7O_2 + 2H_2O = 2FeSO_4 + 2H_2SO_4$$

Iron compounds composed of iron with a valance of three are known as ferric compounds. Ferric hydroxide is a brown gelatinous substance, insoluble in water, and can be made by adding a base to a ferric solution. Thus

$$FeCl_3 + 3NaOH = Fe(OH)_3 + 3NaCl$$

Ferric oxide is used many times as

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a red pigment. It is obtained from ferrous sulfate. The solution is allowed to oxidize and the ferric hydroxide is precipitated by adding lime. This material is then calcined. It is also found in natural deposits.

Ferric sulfate ($Fe_2(SO_4)_3$) is formed by the oxidation of ferrous sulfate.

Potassium ferrocyanide, $K_4Fe(CN)_6$, ionizes as follows:

$$K_4Fe(CN)_6 \rightleftharpoons 4K^+ + Fe(CN)_6^{4-}$$

If a ferric salt is added to an aqueous solution of the above, a deep blue precipitate results which is ferric ferrocyanide, also known as Prussian blue.

$$4FeCl_3 + 3K_4Fe(CN)_6 \rightarrow Fe_4[Fe(CN)_6]_3 + 12KCl$$

If chlorine is passed through a solution of potassium ferrocyanide, potassium ferricyanide is formed.

$$2K_4Fe(CN)_6 + Cl_2 \rightarrow 2K_3Fe(CN)_6 + 2KCl$$

Potassium ferricyanide unites with ferrous salts to form a deep plue precipitate known as Turnbull's blue which is ferrous ferricyanide.

$$3FeCl_2 + 2K_3Fe(CN)_6 \rightarrow Fe[Fe(CN)_6]_2 + 6KCl$$

Cobalt occurs as an arsenide along with nickel. The two chief ores are smaltite, $CoAs_2$, and cobaltite, CoAsS. The element is a silver white metal having a faint trace of blue in its appearance. It is used in making alloys and in electroplating. Cobalt forms cobaltous (Co^{++}) and cobaltic compounds (Co^{+++}).

Cobaltous chloride, $CoCl_2.6H_2O$, is made by treating the oxide with hydrochloric acid. It forms red crystals but if dehydrated the color becomes deep blue. Cobalt sulfide, CoS, a black material, is precipitated from solution by the addition of ammonium sulfide to any soluble salt.

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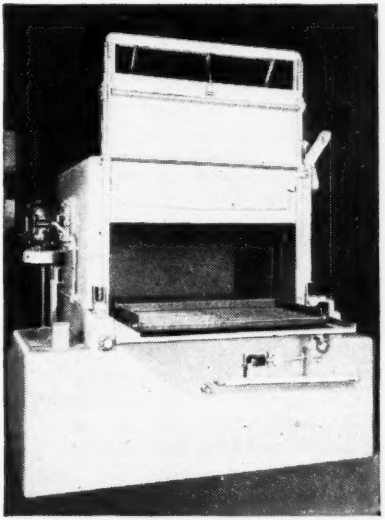

THE last word in practical application of a "walking spray" which moves back and forth across the work, reaching every bit of it. This cuts down the number of spray holes and permits the use of low gallonage pumps which reduces initial and operating costs.

The RANSOHOFF WASHER may be equipped for wash only or for wash and rinse and if desired, a hot air blower may be added for drying. For small parts up to large assemblies.

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Cobaltic hydroxide, $Co(OH)_3$, a black powder, is precipitated by adding a hypochlorite to a cobaltous salt solution. If the nitrate is heated carefully, cobaltic oxide, Co_2O_3, is formed. It will be noted from the above series that cobalt is similar to iron in that it has a valence of two or three.

Nickel occurs as nicollite, NiAs, and nickel glance, NiAsS. The Canadian ores supply about 90 per cent of the world's demand. The ores are roasted and run through a Bessemer process which produces a matte. This is "blown" until all the iron is removed, which leaves behind the sulfides of nickel and copper. These are then reduced to the metals. The alloy produced is separated by an electrolytic process. Nickel is a white magnetic metal which has many properties similar to iron. The element melts at 1452 deg. C. It is used in making alloys in nickel plating and as a catalyst in many chemical reactions.

As in the case of cobalt, there are two series of nickel salts, nickelous and nickelic materials. Nickelous hydroxide, $Ni(OH)_2$, is formed when a base is added to any soluble nickelous salt. If this material is heated, the green nickelous oxide is produced, NiO. Nickelic hydroxide, $Ni(OH)_3$, a black precipitate, is formed when a hyprochlorite is added to a salt of nickel. Nickelous sulfide, NiS, can be precipitated by adding ammonium sulfide to a soluble nickel salt. It is similar to cobaltous sulfide. The addition of dimethylglyoxime to an ammoniacal solution of nickel salt produces an insoluble red precipitate:

$$Ni(Cl)_2 + (HON)_2C_2(CH_3)_2 = 2HCl + NiH_6C_4O_2N_2$$

Several metals from two periodic families are to be studied. Zinc, cadmium, and mercury compose one family which is in group two, while tin and lead are the other family which is in group four. These metals are used in every day life for the manufacture of mechanical devices for the world in which we live. The first metal to be studied is zinc. This material is found in various parts of the United States, but the largest fields are in Missouri, Kansas, and Arkansas. The ore is a mixed lead and zinc sulfide. The zinc sulfide ore is known as sphalerite. The ore is first concentrated, which consists of separating the zinc sulfide from the gangue. This is generally done by flotation process and the resulting ore can be treated in a number of ways in order to produce the metal. Pyrometallurgy can be used, which is nothing more than reducing the sulfide to the oxide by roasting, and the oxide is then reduced with carbon. The reactions are as follows:

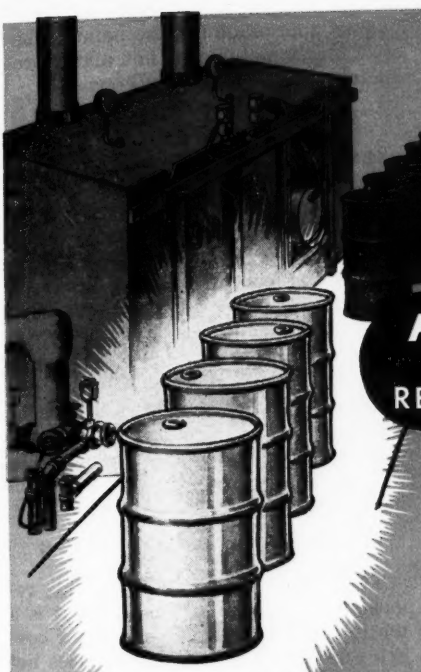
$$2ZnS + 3O_2 = 2ZnO + 2SO_2$$
$$ZnO + C = Zn + CO$$

The metal can be obtained by melting the product and casting into slabs. The temperature necessary for the reduction to take place is 1200 deg. C. while the boiling point of zinc is 907 deg. C. Therefore, all metal produced by this method is in the vapor state and must be condensed in the proper apparatus. If the temperature of the container is above 420 deg. liquid zinc is obtained which can be withdrawn and poured into slabs.

A second process for preparing zinc is by the electrolytic method. This consists in first roasting the sulfide ore with air.

$$ZnS + 2O_2 = ZnSO_4$$

The zinc sulfate thus produced is dissolved out by using sulfuric acid solution. There being other metals in this solution, zinc dust is added to precipitate any metals less active than zinc. The solution thus produced is a rather pure solution of zinc and is run into electrolytic cells using lead as the anode and aluminum as the cathode. A current density of 30-100 amperes



PENNSALT CLEANER
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CUTTING CLEANING COSTS 33⅓%

MANY MANUFACTURERS are faced with the urgent wartime necessity of reclaiming and re-using metal containers. The demand is for a cleaner that will do a *thorough* job—do it *fast*—and keep costs *down*.

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The problem was to remove various types of oil, grease and solvents from steel drums—and to strip paint from these containers. The operation was carried on continuously in a 1000-gallon drum washer at 145 to 155 degrees Fahrenheit.

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The Pennsalt representative was able to improve greatly on this with the correct type of Pennsalt Cleaner. The amount required was only about 35% of the previous cleaner. The cleaning action was highly effective—the drums dried faster—and grease containers could be included in the cleaning operation, an advantage not previously possible.

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per square foot is applied, producing a very pure zinc at the cathode. This method is gaining rapidly in commercial practice and is now a very important method of producing many other metals besides zinc.

Zinc is a silvery white metal which is rather brittle at ordinary temperatures. However, if heated to 100-150 deg. it can be rolled into thin sheets. The melting point is around 410 deg. C. It corrodes slowly in the air, forming a basic carbonate on the surface. This coating acts as a protector for the metal and prevents excessive corrosion from taking place in many instances. However, by the formation of this coating, the metal will tarnish very quickly. It will displace hydrogen from acids.

$$2HCl + Zn = ZnCl_2 + H_2$$

It will also displace hydrogen from steam if the metal is hot.

$$Zn + H_2O = ZnO + H_2$$

One of the biggest uses of zinc is in covering iron surfaces. This is for protection against corrosion. The zinc is applied by three different methods —galvanizing, shearidizing, and electro-galvanizing. The iron in all cases is first cleaned by dipping into sulfuric acid or other suitable materials so that the oxide surface is dissolved. In the first case the iron is dipped into a molten zinc bath. Here a thin coating of zinc is applied to the surface of the iron. In the second method, after the iron has been cleaned it is covered with zinc dust and the temperature raised until the zinc is fused to the surface. The third method consists of making the iron the cathode in electrolytic solution and passing a current through, thereby depositing zinc as a metal from solution. Zinc is also used in making alloys, one of the best known being brass, which is a mixture of copper and zinc. It is used in the manufacture of zinc oxide for the paint industry. Zinc is soluble in hot alkali producing zincates.

$$2NaOH + Zn = Na_2ZnO_2 + H_2$$

Zinc sulfate, $ZnSO_4$, is known as white vitriol and is used as a source of zinc ions in perserving hides and as a mordant in cotton printing. This material is also used in the electroplating of zinc, and so on. The compound is formed when zinc blend is in the form of $ZnSO_4 \cdot 7H_2O$.

Zinc sulfide, ZnS, is the only white sulfide of the metals, therefore, it is used as a paint ingredient known as lithopone. This consists of a mixture of barium sulfate and zinc sulfide, which is prepared by the action of barium sulfide on zinc sulfate.

$$BaS + ZnSO_4 = BaSO_4 + ZnS$$

The materials produced in this reaction are insoluble. The product is a white mixture and has a greater covering power than white lead, does not darken when exposed to hydrogen sulfide and is non-poisonous.

Zinc chloride, $ZnCl_2$, is generally manufactured by allowing hydrochloric acid to react with the metal. The salt thus formed can be crystallized from solution provided an excess of hydrochloric acid is present. The aqueous solutions of the material are used for cleaning metals before soldering.

Zinc oxide, a white powder, is obtained by burning the metal.

$$2Zn + O_2 = 2ZnO$$

It is used in making paints and as a filler in automobile tires.

Zinc hydroxide, $Zn(OH)_2$, is a white flocculent insoluble material produced by adding a base to the soluble zinc salt.

$$ZnSO_4 + 2NaOH = Zn(OH)_2 + Na_2SO_4$$

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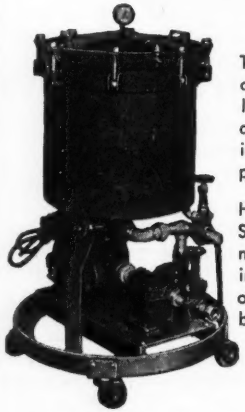

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SPARKLER HORIZONTAL PLATE FILTERS

Zinc hydroxide is soluble in excess of base.

$$Zn(OH)_2 + 2NaOH = Na_2ZnO_2 + 2H_2O$$

Thus, one can see that zinc hydroxide acts as a weak acid or a weak base. Materials having a formula ZnO_2 are called zincates. Thus, Na_2ZnO_2 is called sodium zincate. Zinc combines with the cyanide radical to produce the compound zinc cyanide, $Zn(CN)_2$, and this compound will combine with free cyanide to form complex double cyanides.

$$Zn(CN)_2 + 2NaCN = Na_2Zn(CN)_4$$

Zinc cyanide also reacts with sodium hydroxide.

$$2Zn(CN)_2 + 4NaOH = NaZn(CN)_4 + Na_2ZnO_2 + 2H_2O$$

Thus it can be seen that by this reaction sodium zincate and sodium zinc cyanide are formed in solution. This reaction is important because most of our cyanide zinc plating baths are made up in this manner. This solution gives a very good deposit of zinc if electrolyzed.

As a general rule there are no important minerals of cadmium. The compounds occur along with those of the zinc ores. Cadmium is always a byproduct of the zinc industry. The metal is obtained from the zinc solution, as has been pointed out before, by introducing some zinc dust into the solution, and the material displaces the cadmium and other metals which fall to the bottom as a precipitate. The cadmium is then dissolved as the sulfate and electrolyzed, pure cadmium resulting. The white metal melts at 321 deg. C. and is much more malleable than zinc. It is used in making low melting point alloys in electroplating and as an alloy constitutent for bearings. Copper and cadmium form a very good bearing material which is now used to a great

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extent in the automobile field.

Cadmium chloride crystallizes as $CdCl_2.2H_2O$. The white flocculent hydroxide is precipitated by the reaction of a soluble cadmium salt with a base.

$$CdCl_2 + 2NaOH = Cd(OH)_2 + 2NaCl$$

Cadmium hydroxide is not soluble in excess base, therefore, it is not amphoteric. However, cadmium hydroxide will dissolve in ammonium hydroxide, forming cadmium ammonium hydroxide, $Cd(NH_3)_2\ (OH)_4$.

Cadmium sulfide, CdS, is produced by adding H_2S to a soluble cadmium salt. The color is yellow to red.

$$CdCl_2 + H_2S = CdS + 2HCl$$

The material is used as a pigment in paints, and so on.

Cadmium cyanide or cadmium oxide reacts with free cyanide to form double cyanides, $NaCd(CN)_3$.

Mercury is a silvery white liquid which becomes solid at —38.9 deg. and boils at 357 deg. It is used in filling barometers and thermometers, and in forming amalgams with other metals. Mercury sometimes occurs in the native state, but generally occurs as mercuric sulfide which is called cinnabar, HgS. When roasted the sulfide is decomposed as follows:

$$HgS + O_2 = Hg + SO_2$$

Mercury does not displace hydrogen from dilute acids but will react with oxidizing acids, for example, nitric acid, producing the corresponding nitrates. Mercury has two valences, one and two, and the first type is called mercurous salts, while the second type is called mercuric salts.

Mercurous chloride, HgCl, (calomel) is used for medicinal purposes and is made by heating mercuric chloride with mercury.

$$HgCl_2 + Hg = 2HgCl$$

Mercuric chlorides can be formed by combining chlorine with mercury.

$$Hg + Cl_2 = HgCl_2$$

This salt, known as bichloride of mercury, is very poisonous, and if taken internally causes death. It will be noticed that mercurous chloride, Hg Cl, is used as a medicine, while mercuric chloride, $HgCl_2$, is a deadly poison.

Mercuric oxide is a red crystalline powder formed when mercury is heated in the air to 360 deg. C.

Mercurous oxide, Hg_2O, is formed if sodium hydroxide is added to solutions of mercurous salts. Mercuric nitrate $Hg(NO_3)_2$, is produced by allowing warm concentrated nitric acid to react with mercury. Mercury blue dips are made by adding one ounce per gallon of mercuric chloride, $HgCl_2$, and one half ounce per gallon of ammonium chloride. This solution is often used to cover iron, steel, or brass with a thin layer of mercury so that silver or other metals are not deposited by immersion when placed in electrolytic bath. The reaction occuring when iron is put into this dip is as follows:

$$HgCl_2 + Fe^\circ = FeCl_2 + Hg^\circ$$

The resulting mercury adheres tenaciously and covers all parts of the exposed iron.

The most important ore of tin is casseterite or tin stone, which is the dioxide, SnO_2. This is mined in Bolivia and the East Indies. The tin ore is concentrated by washing so that all foreign material is removed. It is then roasted to remove sulfur and arsenic. Next carbon in one form or another is added and the oxide is reduced.

$$SnO_2 + C = Sn + CO_2$$

The metal is generally purified by heating gently on a sloping hearth. The melting point of the metal being

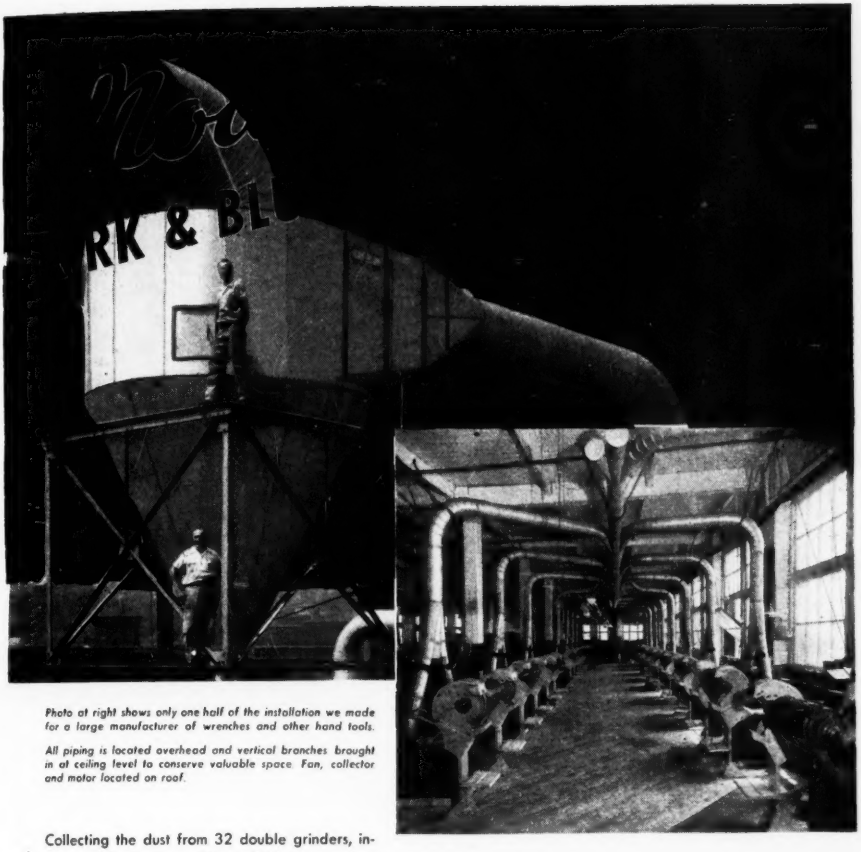

Photo at right shows only one half of the installation we made for a large manufacturer of wrenches and other hand tools.

All piping is located overhead and vertical branches brought in at ceiling level to conserve valuable space. Fan, collector and motor located on roof.

Collecting the dust from 32 double grinders, involving 64 wheels used for polishing operations, presented a problem that called for specially designed equipment.

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Uniformity of suction is maintained by correct design of piping and streamlined fittings so as to produce the correct suction of each hood with a minimum use of power. This is another typical example of why it does not pay to let guesswork leave you "stuck" with units that are not right for your particular job. Get the unbiased counsel and planning of experts—Kirk & Blum Engineers—and you will get a dust control system that is *right*. For further details write to—

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much lower than that of its impurities, the tin melts and flows away from them. The molten metal is then collected in molds as block tin. The metal exists in three solid forms, each having a definite transition temperature. Below 18 deg. C. a gray modification is the stable form. This material is very brittle and crumbles to a powder. At ordinary temperatures it is a white crystalline metal, having little tensile strength but being very malleable. Tin is used for the manufacture of tin plate which is nothing more than iron covered with tin. It is also used in the manufacture of tinfoil and in the preparation of alloys, such as Britannia, bronze, babbitt, and type metal.

Tin has a valence of two or four. The first compounds are known as stannous, while the latter are known as stannic materials.

Tin displaces hydrogen from acids.

$$Sn + 2HCl = H_2 + SnCl_2$$

Tin unites with nitric acid in a definite manner forming stannic compounds instead of the stannous compounds.

$$3Sn + 4HNO_3 + H_2O = 3H_2SnO_3 + 4NO$$

Tin also reacts with sodium hydroxide forming sodium stannite.

$$Sn + 2NaOH = H_2 + Na_2SnO_2$$

Stannous chloride, $SnCl_2 \cdot 2H_2O$, is made as shown above by the interaction of hydrochloric acid with tin. Stannous chloride will go to stannic chloride, $SnCl_4$, rather easily, thus, it is an active reducing agent. It will reduce ferric salt to the ferrous state.

$$2FeCl_3 + SnCl_2 = 2FeCl_2 + SnCl_4$$

Stannous chloride reacts with sodium hydroxide to produce stannous hydroxide, $Sn(OH)_2$.

$$2NaOH + SnCl_2 = Sn(OH)_2 + 2NaCl$$

This hydroxide is similar to zinc and aluminum hydroxide in that it is soluble in both strong acids and strong bases. Therefore, the material is amphoteric.

Stannous sulfide, SnS, is insoluble in water and has a brown black color. It is produced as follows:

$$SnCl_2 + H_2S = SnS + 2HCl$$

It unites with sulfides to form sulfostannates.

$$SnS + Na_2S_2 = Na_2SnS_3$$

Stanic chloride, $SnCl_4$, is produced when chlorine acts upon tin or upon stannous chloride.

$$2Cl_2 + Sn = SnCl_4$$

If ammonium hydroxide is added to $SnCl_4$ the following reaction takes place:

$$SnCl_4 + 4NH_4OH = 4NH_4Cl + H_2SnO_3 + H_2O$$

H_2SnO_3 is called stannic acid. This material can very easily decompose into the oxide and water.

$$H_2SnO_3 = H_2O + SnO_2$$

Galena, PbS, the sulfide, is the most important ore of lead, although cerussite, $PbCO_3$, is also found. Lead is obtained by roasting the ore to convert it into oxide. It is then mixed with coke and limestone and reduced. The result is metallic lead and a slag that forms at the bottom of the furnace which can be easily separated. The material produced is rather impure and has to be separated from antimony, arsenic, bismuth, and copper. This can be done by melting the lead and stirring. The impurities, which are oxides, float to the surface where they can be removed. Gold and silver are present many times and these, along with the other impurities, can be removed by an electrolytic process. This consists of making the impure

The Chronicle of the Corrugated Lining

Spinning the metal into proper shape for a spun alloy steel bottle which formed an essential part of a hydraulic operating system of war plants, resulted in small corrugations on the interior surface of the bottle. A rubber bag fitted inside this bottle. Inflated and deflated by air pressure, sometimes as high as 3000 lbs. per sq. inch, you can readily appreciate what the small corrugations did to the outer surface of the rubber bag. Our problem was to design a coating that would smooth out the corrugations and provide a slick, glass like interior surface against which the rubber bag could move. The coating had to be tough. It had to resist penetration of a hydraulic oil as well.

HORN produced, not only a material with sufficient filling qualities to form a level surface and at the same time provide the high gloss required for a low co-efficient of friction, but a special system for finishing as well.

Then followed exhaustive tests. Among these was one for adhesion and toughness of the film which we will briefly describe. Several of the alloy steel bottles were set up on a target range and 50 calibre machine gun bullets fired thru them. After this firing, the steel bottles were examined to see whether our product had split or cracked beyond the point of immediate contact of the bullet and also to see whether the film had been chipped off by the terrific impact of these bullets. Neither of the two failures had occurred!

Even when a piece of metal was separated by the bullets from the rest of the bottle it took with it its own protective coating in perfect condition. This system of coating is being used with uniform success in the lining of thousands and thousands of these alloy steel bottles.

HORN designed the finish and the method.

A. C. HORN COMPANY

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lead slabs the anode in a bath of hydrofluo-silicic acid and lead silico fluoride. A small amount of gelatin is present as an addition agent to give a smooth deposit. The impurities drop to the bottom of the tank and the pure lead deposits at the cathode.

Lead is a heavy soft white metal melting at 307 deg. C. and boiling at 1525 deg. It has two valences, bivalent and quadrovalent. The metal quickly oxidizes, forming the oxide and basic carbonate.

There are five oxides, Pb_2O, lead suboxide, gray; lead monoxide, Litharge, yellow red; Pb_2O_3, lead trioxide, orange yellow; PbO_2, lead dioxide or peroxide, chocolate brown; Pb_3O_4, lead tetroxide, minium or red lead, red. PbO is formed by heating lead in the air above 600 deg. C. Pb_3O_4 is obtained by heating PbO under 545 deg. C.

Lead sulfate is produced by the uniting of sulfuric acid or any sulfate with a lead salt. It is insoluble in sulfuric acid and for that reason a protective coating is formed on lead when this material is introduced into a sulfate. Thus, we say that lead is insoluble in sulfuric acid, which in reality is not true. Lead is soluble in the acid, but the product, lead sulfate, being insoluble, stops all reaction by insulating the lead from the solution.

It has been mentioned that different metals have different rates of activity, thus, iron will displace tin from solution, but zinc will displace iron. Zinc will also displace cadmium or copper from solution. The metals can be arranged according to their activity. For instance, the most active can be placed at the top of the list and the least active at the bottom. Thus the following order is obtained: Potassium, sodium, calcium,

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magnesium, aluminum, zinc, chromium, iron, cadmium, cobalt, nickel, tin, lead, hydrogen, antimony, arsenic, bismuth, copper, mercury, silver, platinum, and gold. This list simply means that near the top the elements are very active. For instance, potassium and sodium react very quickly with water. Calcium reacts with this compound also, but not as rapidly. Coming down the list the activity is decreased and it is found that magnesium, aluminum, zinc, and iron will not react very quickly with water, but will with dilute acids. The activity decreases as one reads down the list until finally the metal gold is reached which is insoluble in all acids except aqua regia (a mixture of nitric and hydrochloric acid). This can be viewed in another way. If gold is in solution and in this some metallic platinum is placed, the platinum will go into solution in place of the gold. Silver, being higher in the series, will displace platinum or gold from solution. Mercury will displace silver, platinum, or gold. The metal above will displace all metals below, thus potassium is the most active metal and will displace all others from solution.

By using the electromotive series which was discussed above it is possible to produce power. When one metal displaces another from solution, there is a transfer of electrons. Thus when zinc displaces copper from solution, the following occurs:

$$Zn + Cu^{++} = Cu^{\circ} + Zn^{++}$$

The zinc has given up two electrons to the copper. These electrons, when flowing, produce power and, of course, work can be produced by utilizing this transfer. Thus, if a stick of zinc is placed in a solution of copper sulfate, copper is deposited on the zinc rod. In this case the zinc becomes the anode and the copper becomes the cathode of the battery. This can further be illustrated by introducing a stick of copper and zinc into a dilute solution of sulfuric acid. If the two metals are now connected by a wire, a current will flow between the two metals. Upon analyzing the solution, it will be found that zinc sulfate is present. In this case, also, the zinc became the anode and dissolved in the solution while the copper was the cathode. Thus, chemical energy is being converted into electrical energy.

Corrosion may be explained on the basis of several theories, but the best seems to be the electrochemical theory. This is based on the electromotive series. Every metal or alloy has a definite tendency to go into solution and form ions. The higher in the series, the more the metal will have a tendency to form ions. Also, the higher metals will displace the lower metallic ions from solution. Taking iron as a good example, the following will often happen.

$$Fe + 2H^{+} = Fe^{++} + 2H$$

Thus, it is easy to see that water must be present in order to give or carry the hydrogen ions. In the above case it will be noted that hydrogen acts like a metal and is displaced from solution by iron.

In order that the above equation will go to the right, it is necessary that the liberated hydrogen be removed. Otherwise it will act as an insulator and stop all corrosion. The hydrogen can be removed in two ways; namely,

$$(1)\ 4H + O_2 = 2H_2O$$
$$(2)\ 2H = H_2$$

In the first case, oxygen, which is dissolved in water (there always is some of this element present in natural waters), unites with the atomic hydrogens to produce water. In the latter the atomic hydrogens combine to form molecular hydrogen and the latter is liberated as a gas. The higher the concentrations of the hydrogen

Prevent Corrosion on Zinc or Cadmium Surfaces

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Here is the corrosion-resistant finish for zinc or cadmium surfaces—*that does not slow up your production line.* The uniform colors produced with *Iridite* saves further time by simplifying inspection—thus reducing rejects.

As a final finish for zinc or cadmium plate, *Iridite* is currently available in two colors: standard army olive drab and jet black. In addition, many large paint manufacturers have tested *Iridite* as a paint base, and have found it highly efficient.

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Iridite is economical, efficient, easy to apply, quick to dry. The *Iridite* treatment greatly increases the fields of usefulness of the zinc and cadmium plating. We invite you to write for a sample panel to test, with your present or postwar product in mind. Write, wire or phone: Rheem Research Products Incorporated, 809 Chemical Building, 2523 Pennsylvania Avenue, Baltimore 17, Maryland.

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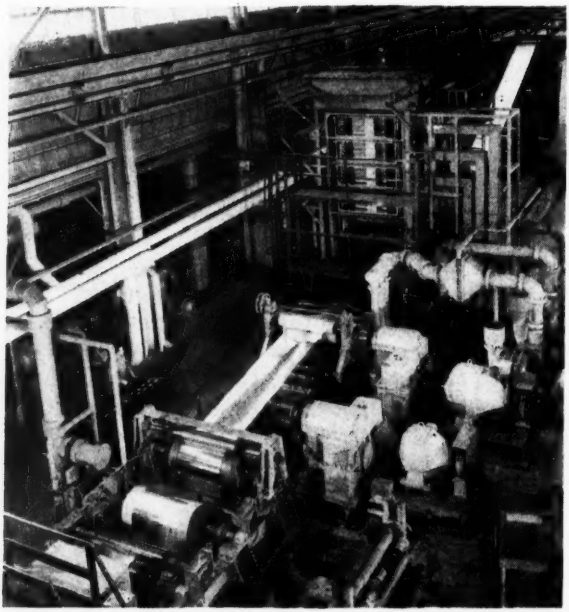
ions, the easier it is to corrode the metal. However, it must be borne in mind that the hydrogen film must be removed, so that the rate of reaction will be determined by the velocity of the last two reactions.

It will be seen that the iron displaces hydrogen. Therefore, the surface where the iron dissolves becomes the anode because it dissolves while the area on which the hydrogen is deposited becomes the cathode. Thus, iron is oxidized while hydrogen is reduced.

It is possible to have anodic and cathodic areas on the same piece of metal. This is often true with a piece of steel. A strain or bend in any part of a piece of steel will make that area anodic and the remaining area the cathode. Impurities in the metal also give rise to anodic areas. Dissimilar pieces will very definitely give rise to this condition. For example, steel and stainless steel should never be used together under moist conditions unless the steel is protected. The steel becomes the anode and dissolves while the stainless steel becomes the cathode and is not injured.

It is possible to stop corrosion by stopping the above reaction. This may be done by applying protective coatings, removing moistures, and so on. The prevention of corrosion is a study within itself and is only touched here.

(Part 13 will be published in our October issue.)



IN the tower shown in the center of the accompanying illustration, electrolytic tin plate is brightened at the rate of 1,000 feet per minute. Six 200-kw., 17,000-volt, 200,000 cycle Westinghouse oscillators supply high frequency power for inductively heating the tin coating until it melts and flows. Before flowing, electrolytic tin plate has a matte surface and appears bluish-white; after flowing, it has a mirror surface and appears bright.

The very narrow area wherein this transformation occurs is called the "flow-line." This can be seen in the illustration as a concave line transverse to the strip midway between the guard rail of the lower platform and the bottom of the upper platform. In the background, the electrolytic tin plate is shown emerging from the after-plating rinse. A 125 h.p., 690/1065 r.p.m., 230-volt, d.c. Westinghouse motor located directly in front of the tower pulls the steel strip through the reflow tower, electrolytic plating cells, pickling and electrolytic cleaning tanks.

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When you have intricate parts to grind and finish, 3-M Abrasive Specialties will do the job with speed and perfection. The wide range of styles, sizes and grits available makes the finishing of hard-to-get-at areas far less time-consuming. For complete information on these high speed grinding and finishing tools, write today for our "3-M Abrasive Specialty Items" booklet.

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PF944

Increasing Efficiency in Metal Finishing

By JEFFREY R. STEWART

Part III

DUE to the vast quantities of war materials which are being shipped to the war areas, the salt-spray corrosion test has become of greater importance recently. Unfortunately, there has been a considerable amount of disagreement and confusion in the paint and varnish industry insofar as the standardization of this test is concerned. Since the addition of salt (sodium chloride) to water increases the corrosion of metal to a very great extent, it is obvious that the percentage of salt in the water is of considerable importance. And yet there are some testing laboratories who use a 10 per cent salt water solution as the corroding medium, and later compare the results with other tests which have been based on a 15 per cent or even as high as a 20 per cent solution. Likewise, temperature, which is another contributing factor, is often disregarded or not firmly maintained. The salt water corrosion test can be considered as a means of disclosing some very useful information regarding the efficiency of finishes on metals, providing strict attention is paid to a recognized and standard procedure. On the other hand, results are of little value from a standpoint of correlation and comparison, if attention is not given to the details of the test.

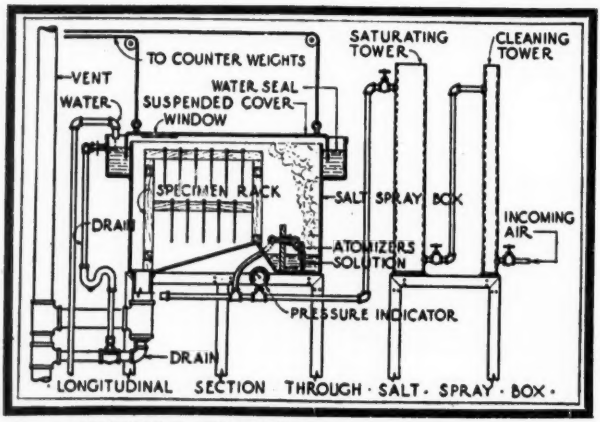

Diagram of salt spray corrosion cabinet. The most important consideration in the operation of such a unit is to control the temperature, concentration of salt, and degree of fog mist within the standardized limits.

Up to July 1944, one of the main drawbacks of the salt spray test was the lack of a means for measuring and establishing the "density of the fog." Thanks to the Bureau of Standards, Washington, D. C., this difficulty has been overcome. In order to eliminate various objections to the many methods for making salt water corrosion tests, and to establish and standardize a universal method, a group of scientific men formed a special and informal committee to study this subject at regular meetings at the Bureau of Standards. Men from industrial plants interested in metal finishing, as well as representatives of the Federal government and specification writers, were included in this group. After the third meeting of the committee, agreement was reached on the basic requirements of a standard procedure. It is recommended that the industry adopt this method wherever it is feasible. The new method will probably be adopted by the American Society for Testing Materials and the U. S. Government. Printed copies of the adopted procedure can be obtained by writing to L. J. Waldron, National Bureau of Standards, Washington, D. C.

War Production Can Be Boosted By Use of Sealing Compounds Based on Synthetic Resins

Most of us realize the importance of the foundry industry with regards to our efforts in World War II. The enormous demands for castings used in tanks, planes, machine tools, ships, and trucks, can only be met by two methods. The first is expansion of production facilities but this is often difficult due to the shortage of manpower. The second is more efficient productivity and reclamation. Sweating or leaking castings which previously had been discarded can now be sealed with any of the new synthetic sealing resins based on phenol (carbolic acid) and formaldehyde.

The commercial phenolic sealing solutions which are now on the market are usually made available in different consistencies. One grade is used for overcoming porosity or small blowholes. For a slight or fine textured porosity, usually a transparent solution of low viscosity is used. For a more deeply-seated porosity, a similar solution is used except that a finely divided mineral filler is incorporated in the medium.

The advantage of phenolic type sealing solutions over other types is the fact that they may be used for both ferrous and non-ferrous metals.

There are two methods for applying the solution. When treating small castings (which, incidentally, may be handled in rather large batches), the solution may be forced into the casting by external pressure. It may also be applied by the vacuum impregnation process, in which the air is first exhausted and then the solution allowed to be "sucked into" the pores of the metal.

The other method involves larger hollow castings. For treating these, no elaborate apparatus is required. The essential equipment is a pump to deliver the fluid and to exert the pressure. The best pressure to use is about 250 pounds per square inch. It is first necessary to fill the casting with the sealing solution after stopping up all ports except one at the base and one at the topmost part of the casting. This allows for entry of the sealing solution and an exit for the air, as well as an overflow for indicating that the casting is full. When the sealing solution appears at the top exit, the chamber is closed, and the pumping is continued until a pressure of 250 pounds is recorded. It is not necessary to hold the pres-

sure at this reading for more than about ten minutes.

It is well to examine the external walls of the castings to ascertain whether or not any of the sealing solution has percolated through the walls. The casting should then be grained and washed with solvent to remove any excess solution from the surface. The next operation usually consists of a curing process. This is performed by heating the casting for three hours at a temperature of 100 deg. to 135 deg. C. This completes the procedure and should have effectively sealed the porous texture of the casting.

One interesting feature of this process is the marked resistance to various destructive ingredients after the material has been cured. For instance, it is unaffected by hot or cold water, steam, hot oil, various chemicals, and a temperature of 400 deg. F. Since no special apparatus is required and no special skilled labor is essential, the cost of treatment per casting is rather low.

Researches by the Rustless Iron and Steel Company have recently disclosed some interesting information on how to blacken stainless steel. Using straight-chromium stainless steel, the surface is treated with molten sodium dichromate at a temperature of approximately 615 deg. F. If a temperature of 730 deg. to 750 deg. F. is used, good results can also be obtained, providing a time interval of 15 to 20 minutes is used. It has been found that this black coating is adherent, is permanent in color, and actually improves the corrosion resistance of the basic metal.

The U. S. Department of Agriculture recently developed a synthetic soy bean lacquer which chemically is ethylene diamide polyamide. To shorten the term, the word "norelac" has been coined. It is said to be better and cheaper than most coatings for paper, films and foils, and is transparent, thermoplastic, greaseproof, waterproof and acids and alkalies.

The Honorary Advisory Council for Scientific and Industrial Research in Ottawa, Canada, has recently acquired a new method for applying selenium coatings. The process consists in disassociating selenium in a flame of a combustible mixture to form reactive radicals and fragments. Subsequently, the cracking zone of the flame is played on the solid surface to form a continuous glassy coating on the non-metallic element. This new process should be of considerable interest to manufacturers of photoelectric and sound motion picture devices.

A report recently received by the writer from the Experimental Station of the Hercules Powder Company indicates that fundamental research work has been accomplished on a flame-resistant nitrocellulose. As most of us realize, one of the main disadvantages of the use of nitrocellulose in lacquers was the flame and explosion hazard. The first step toward the successful production has just been completed. The report describes the results obtained in convenient tabular form. This consists mostly of data on the effect of varying amounts of tricresyl phosphate and magnesium ammonium phosphate in a nitrocellulose lacquer formulation. Other useful and authentic data are also presented.

Seven new patents have just been granted to the Sherwin-Williams Company and these carry a total of 179 claims. They deal with the manufacture of azo pigment dyestuffs intimately associated with a water-insoluble metallic soap. The combination effects new physical characteristics in the resulting pig-

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Convenient to use . . . resists all ordinary solutions

You can build up a highly resistant insulation, in short order, with Unichrome "Air Dry" Rack Coating. Racks are dipped in the shipping container . . . dried at room temperature.

After several years study, we formulated this rack coating with the best available synthetic resins. And compounded them to develop the utmost resistance possible with an air drying material. The result—maximum protection and minimum recoating cost for all cycles where an air dry material can be used. Countless shops now standardize on "Air Dry"—because they have found it is convenient—stands up under 500 and even 1000 plating cycles. Write today for prices or a trial order.

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PROPERTIES

Chemical Resistance—Excellent for all plating cycles.

Toughness—Withstands repeated flexing and shop handling—cuts cleanly and easily at contacts.

Drying—Dipped and dried at room temperature in container in which it is shipped.

Adherence—Excellent for all except the severest cycles—in which case Coating 202 is recommended.

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Unichrome Coating 202—a new rack insulation, similar to "Air Dry" but which is force dried to obtain the extra adherence required in anodizing and hot, strongly alkaline solutions.

Unichrome Quick Dry Stop-Off 322—for cyanide copper and other plating work requiring an extremely adherent stop-off.

Unichrome Quick Dry Stop-Off 323—for chromium and other plating work requiring a stop-off that can be peeled off after use.

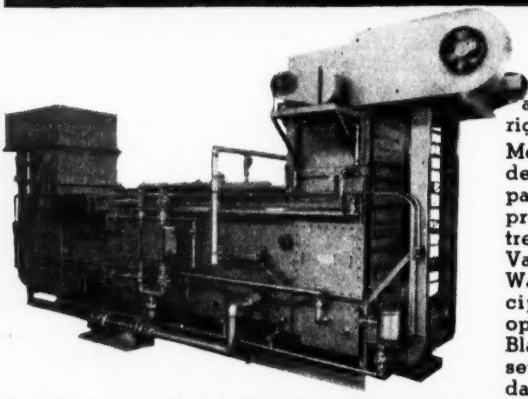
Unichrome Resist—a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

ment composition. The physical properties which are improved include enhanced film gloss and greater resistance to lithographic breakdown.

The problem of drier absorptive properties of pigments was studied several years ago by the writer while associated with the National Paint, Varnish and Lacquer Association. Most of us are familiar with the disadvantage of certain enamels which fail to dry or are slow drying in spite of the fact that the required amount of drier is used. Black and blue pigments are notable for this characteristic. Freshly ground enamels produced from certain pigments show a normal drying time, but after aging for a few months, they often show retarded periods of drying. It was found that this phenomen was primarily due to the absorptive capacity of driers by the pigment. The pigments which cause the greatest trouble in this respect were lampblack, Prussian blue, and chrome green. Since that time, when these initial researches were completed, the Vogel-Snyder process has been discovered and was recently acquired by the Binney and Smith Company. This new invention usually applies to carbon black pigment. It consists primarily of an aqueaous vehicle or solution which carries with it an inactivating compound. This comprises an inorganic salt of chronic acid or a water-soluble inorganic salt of hydrochloric acid.

The subject of treating metal prior to painting has been studied extensively by the Parker Rust Proof Company. They own a large number of patents and processes, one of the outstanding of which was granted during the last few months. U. S. Patent No. 2,351,605 is a process for treating and coating metal surfaces by an acidic phosphate coating solution which is accelerated by a nitrite.

QUICK... ECONOMICAL... *Solvent* DEGREASING



The time is here when a thorough degreasing job must be done fast and *at low cost!* That's a Blakeslee job. It is being done right now in hundreds of plants. Metal components of all kinds—from deep drawn stampings to threaded parts—are completely cleaned and prepared for finish, assembly heat-treating, etc. Blakeslee Solvent Vapor Degreasers and Metal Parts Washers operate on simple principles which assure minimum operating expense. Let us send a Blakeslee representative to see your set-up and make our recommendations. Write for 24 page bulletin.

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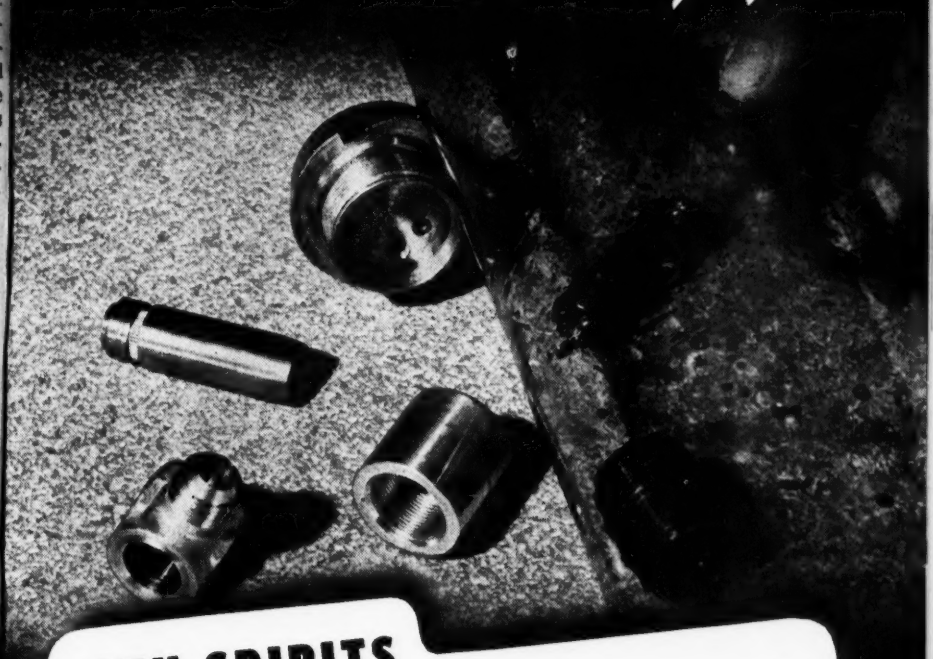

SUN SPIRITS

speeds up drying rate . . . eliminates greasy film on parts

Army Ordnance specifications are tough . . . and they should be . . . because victory depends on the supplies and materials going to our fighting men. That's why one plant, packaging war parts, decided to change solvents in their metal cleaning operations.

Delays in production had caused a sharp decline in the number of pieces packed per day. Troublesome oily films slowed up progress . . . necessitated long intervals of drying time between the washing and rust preventative applications. They were not able to meet required standards.

Troubles were eliminated, after switching to Sun Mineral Spirits. Its high volatility speeded up the rate of drying . . . stepped up production and output. Oily films are now nonexistant . . . parts are cleaned thoroughly and efficiently.

You can profit, likewise, by cleaning with Sun Spirits in your plant. It's fast . . . requires no mixing or heating . . . is always ready for instant use. For more factual information, write for your free copy of "Case Histories of Cleaning Up War Parts."

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HELPING INDUSTRY HELP AMERICA

The most important step in this invention is the inclusion of an acid to the solution which increases the acidity, but does not change the amount of phosphate compounds in the solution. The amount of acid added is adjusted so that it will be sufficient to counteract neutralization by the nitrite.

The Alexander process was invented by Peter P. Alexander of Marblehead, Mass., and was assigned as U. S. Patent No. 2,351,798. This method is essentially a coating of a film consisting of an alloy of copper and titanium. This is applied by means of a very high temperature. The titanium is usually in the form of powdered titanium hydride, and the combination is applied in an atmosphere of hydrogen. The optimum temperature has been found to be about 878 deg. C. This temperature is somewhat below the melting point of copper, and yet allows diffusion of the titanium and copper which flows over and adheres to the metal surface.

The Bushrod process is one where magnesium and magnesium alloys are treated for the prevention of corrosion. The metal is first treated with a solution of manganous sulfate which is capable of forming a film of manganous hydroxide on the surface of the metal. The metal is later treated with an aqueous solution of an oxidizing salt which is capable of changing the manganese hydroxide to manganese dioxide. The details of this invention can be found in U. S. Patent No. 2,352,076.

A 10,000-ton ship, after a year of service, will often have as high as 30 tons of barnacles, stowaway mollusks, and algae on her plates. This will reduce the speed of the ship by several knots. The fouling of ships' bottoms is now being reduced by use of anti-fouling and anti-corrosive paints on the metal which usually contain compounds of mercury, copper and tar.

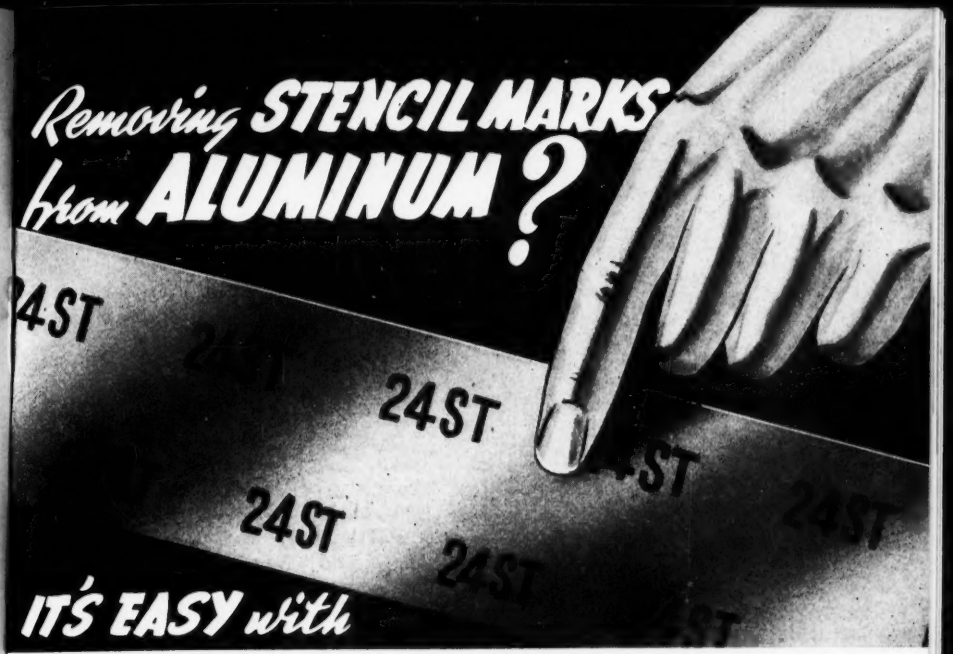
High-Speed Copper Plating

AN improved high-speed copper plating process which is claimed to reduce operating costs and speed up production rates is announced by E. I. du Pont de Nemours & Co., Wilmington 98, Del. This improved method is a development of the copper-plating process introduced by the Electroplating Division of the company in 1938.

The original method utilized a carefully compounded and controlled sodium copper cyanide bath operating at 100 per cent current efficiency and at increased current densities. The new method was created by working out a means of substituting potassium cyanide and other potassium salts for the sodium salts formerly used, with still further increases in current densities. Development of methods for producing the potassium salts in this country and technical advances in their use in plating baths made the substitution possible.

Of major importance among war applications of copper plating is its use as a stop-off or mask in selective case hardening of steel parts to increase wear resistance. This permits certain portions of machine parts to be hardened to resist shock or wear, while the copper-masked sections are left softer and tougher.

Copper is likewise said to be ideal as a corrosion-resistant plate and as an undercoat for decorative finishes, such as nickel and chromium. The ease with which it can be buffed makes it particularly useful in the production of highly polished articles.



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SAFE ..... Rugged enough to thoroughly remove all forms of oil . . . but sufficiently inhibited to prevent pitting, discoloration, or other surface attack on aluminum.

FAST ..... Contains the most efficient wetting agent available for "bullet speed" peneration of soil. Requires no presoak or manual action.

RELIABLE ..... Compounded under strict laboratory control to insure uniform superior performance and dependable action. No toxic fumes . . . no fire hazard . . . no injurious effects.

FREE-RINSING ..... No oily film . . . no powdery residues remain on the surface to interfere with subsequent finishing operations. No floating scum to resoil parts as they are withdrawn from the tank.

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SERVICE MEN AND WAREHOUSE STOCKS COAST TO COAST

The Finishing Room Grows Up

By BRYANT W. POCOCK

THE finishing room of the modern large plant no longer exists. In its place has come the finishing department, an entity which is seldom confined to four walls unless they be the walls of the plant itself. The finishing department is more apt to be an institution, like the plant engineering department or the receiving department or the maintenance department, whose ramifications extend and spread out through the entire factory like the tentacles of some gigantic octopus, or the web of an omnipresent spider.

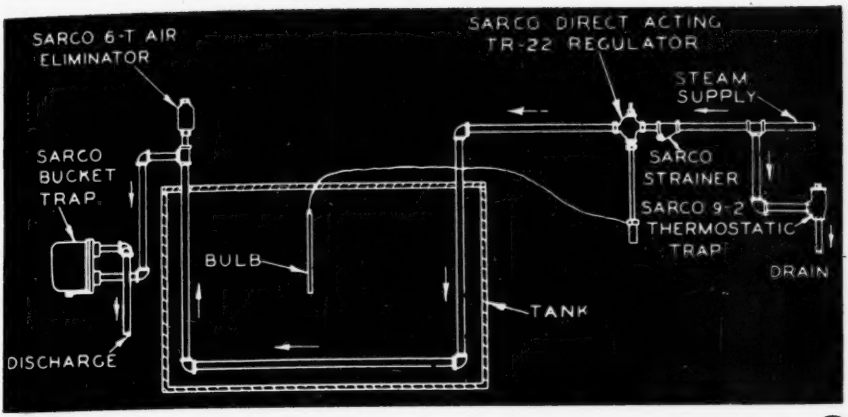
The subdivisions, or units, of the finishing department may be located almost anywhere. Depending upon the manufacturing needs of the plant, an electroplating room may be required near the center of the ground floor, while a smaller plating room may be desirable at one corner of the third floor in order to eliminate transportation time to the larger one below. Simultaneously, several spray booths may logically comprise a third unit somewhere on the second floor, about half a city block down aisle X from a multiple bank of infrared drying lamps which form an integral part of still a fourth unit. The laboratory, which may have as one of its many functions the maintenance of control of all solutions and materials used in the finishing department, may be located a mile away from any of the units mentioned, possibly even in another building.

Particularly within the last two years, and as a result of the unprecedented scramble to get into the business of producing war materials, many large plants have been obliged to convert drastically the blueprints of their production lines. That they succeeded in doing so, and in time to turn the tide of battle, constitutes probably the greatest single reason why we are here today, able to chronicle the event with a free hand.

Nevertheless, in many instances conversion to all-out war production was of necessity too hurried. Companies were given contracts and plants were converted to fill them. Before production was well under way, new contracts came along, which frequently made the initial setup seem insignificant. A second revision of the lines was necessitated, followed by a third and sometimes by a fourth revision. No one in those early days of mass war production could foresee the ultimate extent of that production, any more than he could forsee the ultimate extent of the public debt.

Increased Production

We have seen production goals multiplied tenfold within two years. We

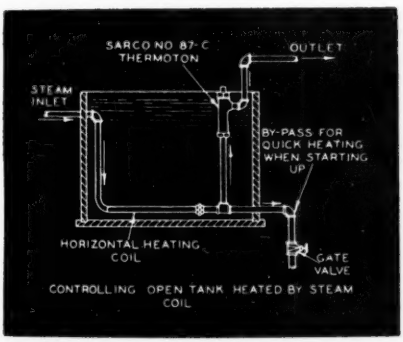


How exact should plating control be?

Above we show a job which called for extreme exactness and reliability of tank temperatures. It is held within a degree — is protected against air binding, foreign material in the lines, and against needless waste of heat.

Below is an example of the most inexpensive tank control, which acts as both a steam trap and a regulator and holds within a few degrees.

If you need both heating and cooling for chromium or other processes, Sarco Electric Controls will do the trick.



The nearest Sarco representative can select the lowest cost combination to give the results you want on every process in your shop. Ask for the catalogs on plating control.

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have seen one plant converted from a civilian economy to the manufacture of airplane engines, only to be followed within a few months by another conversion, this time to the manufacture of propeller blades. We have seen a complete chemical, physical, metallurgical, and metallographical laboratory set up and placed in operation in two different locations on the ground floor of another plant, then torn down and set up again, this time on the third floor. We have seen the various units of the finishing department set up, torn down, moved around, always bigger than they were before, but never where they were before, until the manager of one plant claimed that he fully expected some day to be sprayed with lacquer in his own office.

The urgency of the situation, however, is at long last over. We should be able to look forward to a period of relative stability, and at no time in the future should we again be confronted with a situation of such gravity that the efficiency of long term planning must be sacrificed for speed. This, at least, is what we must believe, and believe thoroughly.

Assume, then, that we shall once again have opportunity for systematic organization; what are those factors which must be considered in designing, locating and operating the various units which make up the modern finishing department?

First and foremost of course is a thorough understanding of all phases of the particular manufacturing processes to be employed in the plant. Then the role of the finishing department in these processes must be surveyed to completion, and finishing units designed and located as strategically as possible with regard to the overall efficiency of the plant as a whole. The peculiar requirements of individual units should be passed upon by experts before final plans are approved. As an example of the importance attached to expert opinion may be cited the adequateness of ventilation required wherever carbon tetrachoride or trichloro-ethylene are used, a fact which has frequently been discovered first by the workmen involved and which has been responsible for more than one managerial headache. In one plant of which the writer has knowledge, such a situation proved incorrectable and the operators became sick at alarming rates. Then some one announced that dill pickles would counteract carbon tetrachloride poisoning, and the men took to eating dill pickles in wholly undigestible quantities. The truth of such an idea is scoffed at by medical men, but the psychology involved proved quite sound.

Probable Goals

Minimum, optimum, maximum, and probable production goals should be known well in advance of final floor plans, and a satisfactory conception of possible future growth should be sought at the very start. The question of a conveyor system should be settled, and what kind, and the routing of parts should be established once and for all. If automatic machinery is to be used in the finishing department, the exact machinery should be decided upon in time to plan its location intelligently in respect to the rest of the plant. It is strictly uneconomical to find out six months after operation gets under way that a couple more pits have to be dug, which involves moving every machine on the floor 20 feet west, as has happened more than once. Or to discover that two dip tanks are superfluous in the plating line-up and continue to have the parts automatically and gracefully lowered first into one empty tank, then into the other.

The problems associated with the

The NEW Metal Cleaning

EVEN A FINGERPRINT WILL NOT "TAKE"...

—after a single stage of spray washing by our latest synthetic fluid process. This process is one of the most dramatic results of 11 years of Solventol work with metal-liquid inter-face phenomena and fluid mechanics. Major industries have already proven that it not only removes all greases and inerts instantly—but conditions all metals —against rust, corrosion and hand soil—during production, assembly and inspection. In most applications available washers are convertible. In others, new, compact and progressive units are especially designed to give maximum effect. Write, wire or telephone Solventol Chemical Products, Inc., 15841 Second Avenue, Detroit, Michigan.

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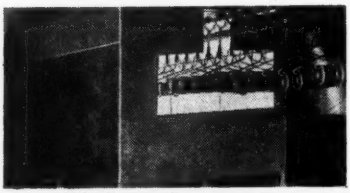
Difficult DRYOFF, DIPPING TRIPPING and PAINT BAKING JOB MADE Easy!

Problem at Gunn Furniture Co. Solved by JENSEN Installation

★ **PROBLEM:** to speed time and save labor on dryoff of bonderizing, paint dipping, tripping and paint baking operations in connection with 75 mm. shell carrying cases.

★ **SOLUTION:** Jensen "Dual Heat" Infra-Red Ovens synchronized with Jensen conveyor system for draining of paint where tripping operation is completely automatic.



Shell cases leaving water dryoff oven.

Automatic paint dipping and tripping.

WRITE FOR CATALOG

JENSEN "Dual Heat" INFRA RED OVENS

JENSEN Standard and Special CONVEYORS

JENSEN SPECIALTIES, Inc.

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prevention of rust are real and are worthy of consideration at the outset. A freshly exposed polished steel surface will show rust spots in 20 minutes in the atmospheres of most plants unless coated with a suitable rust preventative. This surface corrosion is accelerated in acid-containing atmospheres, such as exist in the neighborhood of most plating rooms, and is greatly accelerated during the hot, damp summer months by the natural humidity of the air. All these factors should be considered, and dip tanks containing rust-preventative mixtures whose efficacy has been proved should be located at once wherever they will ultimately be needed. They should be kept filled and ready for use at all times, and the solutions should be checked at frequent intervals. The same is true of organic liquid type degreasers and washing machines using proprietary compounds. Along toward the spring of the year a check should be kept of atmospheric humidity, and the moment it starts to get high an increased vigilance should be set in motion to prevent the corrosion of polished surfaces.

Laboratory Control

Reference has already been made to laboratory control of materials and solutions used in the finishing department. This is a function which naturally falls under the scope of a chemist's work, and should be entrusted to a person having chemical training. Almost any one can be educated to perform the simple titrations and potentiometric analyses concerned with electroplating solution control and the routine checking of materials, and no trouble should be experienced as long as the expected happens; but the moment something goes wrong, it usually takes a chemist to set matters right once more.

RUST !!

Prevention or Removal

In the Humid Months of Summer and Early Fall—the Rusty Season—the Rust Problem Becomes Acute

Rust, especially during rainy, humid weather, often becomes so troublesome as to seriously interfere with the steady flow of production. Rust can disrupt the whole production line and cause serious bottlenecks unless steps are taken to prevent or remove it during fabrication. With ACP Deoxidines rust removal becomes a simple matter of routine.

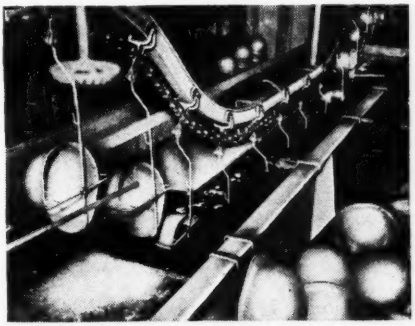
RUST REMOVAL

There are types of Deoxidine adapted for use in large, continuous, mechanized production in power spray washers that remove both rust and oil. Other types are adapted to immersion processes that may be mechanized or manually operated to suit production needs. There are still other types for hand wiping processes to remove occasional light rust that otherwise would require slower and more laborious mechanical operations. These and other Deoxidines not only clean the metal—removing rust and destroying or inhibiting rust producers—they also properly condition it for painting.

A—Spray types of Deoxidine are adapted to the cleaning and processing of large surfaces in quantity production.

RUST PREVENTION

Peroline, a combined chemical and oil, not only provides a thin oil coating, effective in retarding rust, but it is unique in that it removes blushes of rust and marks from sweaty hands and destroys visible or invisible chemicals that would develop rust under conventional preventing coatings. While the amount of rust removal with Peroline is limited, its ability to remove thin coatings will often eliminate a separate cleaning or salvaging operation.



B—An immersion type of Deoxidine is well suited to the rapid cleaning of helmets with mechanized equipment.

Today, Deoxidine, Peroline and other ACP Chemicals are aiding in the production of many war essentials. They are aiding in salvaging various items which, due to improper cleaning or lack of proper protection, have become rusted during fabrication and storage. They are helping to insure satisfactory finishes and are minimizing rejections in the production of many vital war supplies including Shells, Rockets, Ammunition Containers, Automotive Equipment (jeeps, tanks, trucks, etc.), Marine Equipment, Aircraft and Aircraft Parts, Signal Corps Equipment and hundreds of miscellaneous components.

Further information on rust removal or prevention and Service Data Sheets on Deoxidine and Peroline may be obtained by addressing the American Chemical Paint Company, Ambler A-9, Penna.

A program of systematic sampling of all materials and solutions in the various units of the finishing department should be established in cooperation with the laboratory, and a member of the laboratory staff should be responsible for both sampling and analysis. Such analyses should include concentrations and pH of all important pickling, stripping and electroplating baths, cleaning solutions, degreaser liquids, rust-preventative mixtures, organic finishes, and so on. Modern degreaser liquids having a trichloro-ethylene base are usually treated with one or more patented inhibiting agents, whose purpose is to prevent chemical breakdown and the development of acidity. Chemical tests must be conducted on these materials at frequent intervals in order to ascertain that they have not deteriorated to the danger point. Degreasers subjected to continuous or even intermittent use in large plants have to be cleaned out periodically and "sweetened." Their manual controls must also be kept adjusted properly to ensure continuously efficient operation. All these things quite properly can be placed under laboratory supervision.

Safety

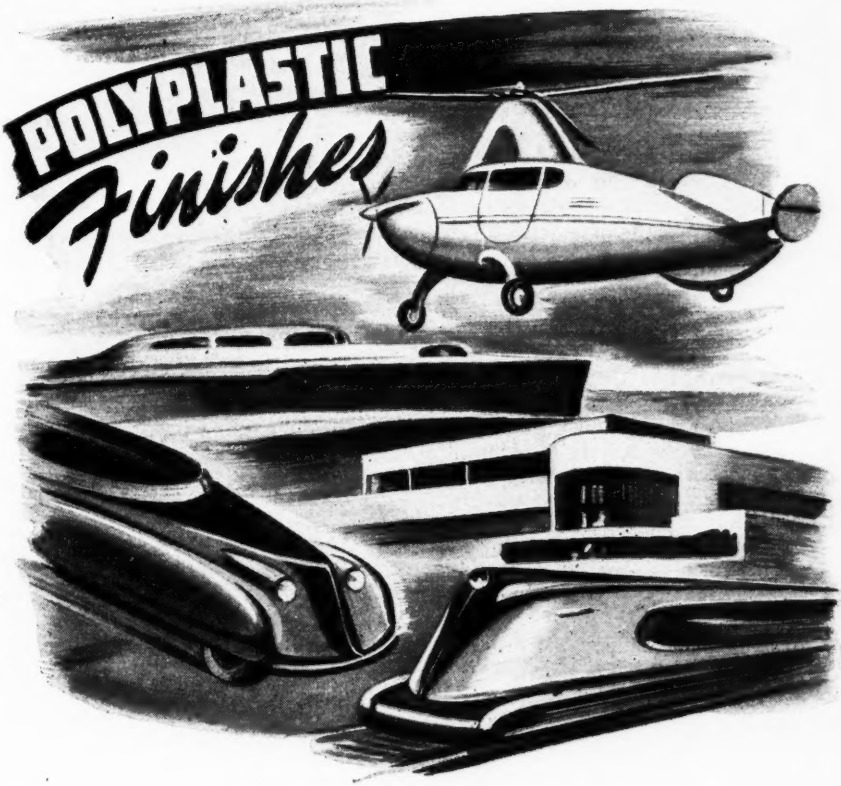
The element of safety is just as important in the finishing department as it is anywhere else. The fire hazard associated with many organic finishing materials should be recognized and proper precautions should be taken to minimize it. It should be thoroughly understood by everyone in the department that the first thing to do in cases of acid burns is to bathe the affected part immediately under cold running water. A safety shower should be installed in the plating room and also in the acid storage room. The acid storage room so far as is possible should be kept a model of cleanliness, and not, as the writer has seen in some case, a typical "Fibber McGee" closet, piled high with dirty, unkempt 5-gallon bottles of every imaginable acid, with half of their labels missing. Under no circumstances should cyanides be stored anywhere in the vicinity of acid, as a plant fire might conceivably allow the two to mix, releasing deadly fumes of hydrogen cyanide gas. A valuable lesson can be gained from the experiences of most public utilities companies, who long ago learned how to cut down their accident rates, at the same time making of their premises enjoyable places in which to work by keeping everything neat, clean, trim and ship-shape.

Injury to the skin from irritating chemicals can produce eczematous conditions simulating genuine infectious dermatitis. These lesions are more pronounced in some operators than in others, due largely to particular constitutional inadequacies characteristic of the afflicted individual, and are always exacerbated by predispositions to allergies in general. Such syndromes can be alleviated by use of an ointment recommended by most industrial physicians, made by mixing a pound of pure lanolin with a half pint of castor oil. It is of course essential that a supply be maintained of such protective devices as rubber aprons, gloves, sleeve guards, "dummy" spectacles or goggles, and so on.

Illumination throughout the finishing department must be the best possible, both in adequacy and in kind. The wave-lengths used should approach those of the solar spectrum. This is particularly true where the detection and matching of colors are concerned.

Recovery of Paint

Opportunity should be provided for the recovery of waste paint spray



Let us work with you on Post-War Products

STANDARD VARNISH has anticipated sweeping changes in the design and fabrication of post-war products, and its research laboratories are ready with advanced formulations in protective coatings.

As leading engineers of product finishes for over 70 years, we invite your confidential consultation on the development of specific polyplastic post-war finishes for your products of tomorrow.

Let's start with the finish; its' what they'll see first!

STANDARD VARNISH WORKS

Engineers of Product Finishes

STATEN ISLAND, NEW YORK **CHICAGO, ILLINOIS**

Since 1870

from the sludge waters of spray booths. A little thought and cooperation with the laboratory staff will bring to light many other possibilities of recovering waste materials at considerable saving to the company. A typical case in point was an investigation carried out in one plant, where abrasive grinding discs used in finishing aluminum parts to dimension became so clogged with this metal after a short period of use that they were practically worthless and had to be discarded. A simple method of removing the aluminum without damage to the discs was developed, and it was found that the latter could be reclaimed five times before they wore out as a result of their natural abrasive action. Another investigation produced the formula for a transfer bluing for gages that would not become tacky or dry out. In many plants a continuous program of research is actively fostered, whose primary *raison d'etre* is the ferreting out of new and more efficient systems of operation with concomitantly increased economy to the plant.

The old-fashioned finishing room has gone the way of the spinning wheel and must be allocated to the museum along with dope cups for automobiles and mustache cups for gentlemen. It has been graduated *summa cum laude* to the most distinctive and significant system of multiple processing units in the modern plant and bids fair to be henceforth of paramount importance in all plants.

Miniature Waterfall Salvages Paints for 30,000 Extra Jeeps

USE of a miniature "Niagara Falls" to carry off excess paint from spray guns has enabled Willys-Overland Motors to salvage 75,000 gallons of enamel — enough to paint 30,000 "Jeeps." This technique is returning 6,000 gallons of reclaimed enamel monthly or enough to paint 2,400 scout cars, since one-half gallon of red primer and about two gallons of olive darb are required to give the Jeep its battle "make-up."

Each Jeep is painted by passing between manually-operated spray guns and the waterfall. The falling water catches the excess paint spray and carries it into a wash system where it is removed from the top of the water and sent to chemical laboratories for reprocessing.

The recovered paint sludge also contains vital and critical war materials, such as fats, oils, glycerine and anhydride, the latter chemical being important in the production of rubber, plastics, and medicine.

Chemical laboratory reports reveal that during the 18 months the program has been in operation the "little Niagara" has carried away for salvage approximately 97,500 pounds of vegetable oil, 60,000 pounds of phthalic anhydride and 30,000 pounds of glycerine.

"The Rewards of Industrial Efficiency" is the title of a 12-page brochure now being issued by The Fostoria Pressed Steel Corp., Fostoria, Ohio, presenting a step-by-step story of infrared and how it can be efficiently applied to present and future industrial baking, drying, dehydrating, and preheating problems. Copy of Flashes No 344 free upon request.

Having TROUBLE with ZINC Plating?

Probably due to lack of rack insulation.

BUNATOL No. 720 is a new insulation that will actually stand up in ZINC and other strongly alkaline plating solutions such as CADMIUM, TIN, SILVER and duPont high speed COPPER.

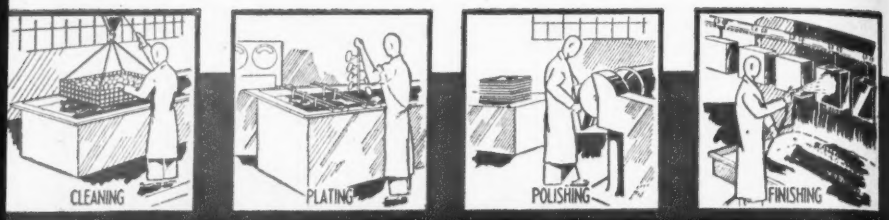
720 has the heat resistance to resist very hot cleaners, adhesion to prevent peeling, and great chemical resistance to strong alkali. Excellent in acid solutions too.

Easily applied, quick air drying to a smooth, permanently flexible, glossy finish. No carry over. Fewer coats required.

A generous test sample will tell you more about BUNATOL 720 than space here permits. Write for it on your letterhead today and learn how you can take the grief out of plating ZINC and other metals.

NELSON J. QUINN COMPANY
TOLEDO 7, OHIO

BUNATOL 720



News of the Industry

Kindig Appointed Assistant General Manager

Gordon H. Robertson, general manager of the Industrial Division, The Sherwin-Williams Company, announces

M. A. Kindig

the appointment of M. A. Kindig as assistant general manager. Mr. Kindig has had a varied industrial experience in the company's Cleveland, Chicago, and Washington divisions. Duties in his new position will revolve around the company's efforts to better acquaint industry with its industrial finishing services. He will also play an important role in forthcoming plans to reconvert the company's activities to peacetime products. Mr. Kindig will make his headquarters at Cleveland, Ohio.

Cowles Ohio Representatives

The Cowles Detergent Co., 7016 Euclid Ave., Cleveland 3, Ohio, announces the appointment of Charles W. Churchill as technical engineer for Northeastern Ohio and Western Pennsylvania territory. Mr. Churchill has a background of education and finishing experience which well qualifies him for this job.

Clyde E. Lowe will cover Cleveland and Northwestern Ohio. He was born in Cleveland and educated at Mount Union College. Mr. Lowe's wide experience in metal cleaning, wire drawing, and wire coating has fitted him well to handle the problems of the metal-working plants in his territory.

Dr. William Blum Honored

The board of directors of The Electrochemical Society, an international organization, announces the award of the eighth Edward Goodrich Acheson medal and thousand dollar prize to Dr. William Blum, chief of the Section of Electrochemistry, U. S. Bureau of Standards.

Dr. Blum is to a very large measure responsible for the standardization of electroplating methods and of plating formulas. He has been with the Bureau since 1909, and for a number of years was closely associated with Dr. W. F. Hillebrand, former chief chemist of the Bureau.

The formal presentation of the gold medal and $1,000 prize will take place at the fall convention of The Electrochemical Society at Buffalo, N. Y., October 13, 1944.

Jones-Dabney Promotes Litchfield

The Jones-Dabney Company, Louisville 8, Ky., announces the appointment of George A. Litchfield as vice president and director of sales. Mr. Litchfield joined the company ten years ago as field representative in the Chicago area. Subsequently, he was promoted to eastern divisional manager with headquarters in Malden, Mass. After successfully serving in this capacity, he was transferred one year ago to the company's main offices at Louisville, from which point he will direct the industrial sales activity of the company.

E. S. Niagara-Buffalo Meeting

Buffalo has been chosen for the forthcoming meeting of The Electronchemical Society from October 12-14 inc. 1944. Hotel Statler will be headquarters for this Fall meeting which promises to be well attended. Hence, it is suggested that all who expect to attend this session make their hotel reservations early.

The local society committee is headed by Paul S. Brallier who has appointed the following sub-committees:

Arrangement Committee, C. W. Wernlund.

Program Committee, R. B. Hammond.

Entertainment, M. B. Geiger and R. E. Hulse.

Sewall Paint Appointments

The appointment of Cecil H. Bathurst as sales manager and Weldon O. Yocum as advertising manager of the Sewall Paint & Varnish Company has been announced by Grover M. Hermann, president of the American-Marietta Company, 43 E. Ohio St., Chicago 11, Ill., which recently acquired the Kansas City concern.

Mr. Bathurst, who has been with the Sherwin-Williams organization for 14 years, will inaugurate a sales expansion program for Sewall. He has an outstanding record in paint merchandising and in the development of dealer and jobber sales.

Mr. Yocum, formerly advertising manager of Oscar Mayer & Co., Chicago, will work with Mr. Bathurst in the preparation of an entirely new and complete merchandising and dealer advertising program.

Turco Organic Research Staff

Jean Wynkoop recently was appointed to the organic research staff of Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif., according to S. G. Thornbury, president and technical director.

Jean Wynkoop

Miss Wynkoop recently received her M.A. degree from the University of Southern California for her work on industrial water softeners. While completing her studies, Miss Wynkoop devoted part of her time to laboratory work in the Turco plant and thus is thoroughly acquainted with the synthesis of industrial chemical compounds.

Previously, Miss Wlynkoop took her A.B. degree at Whittier College, was assistant research librarian at Union Oil Company in Wilmington, Calif.. and an instructor in mathematics at Marlborough School for Girls.

Dr. Frank J. Tone Passes

Dr. Frank Jerome Tone, chairman of the board of The Carborundum Company, died at his home at Niagara Falls, N. Y., on the morning of Wednesday, July 26, after a long illness. In the death of Dr. Tone there is recorded the passing of one of the truly great figures in the world of electrochemistry and electrometallurgy. He was one of the pioneers in both of these fields of science and one whose many contributions to industry through his

research and talents will long be regarded as memorials to a brilliant career.

Dr. Tone was one of those men rare in industry. He had the combined attributes of an outstanding scientist, inventor, a skilled engineer, a keen business man, a far-sighted executive. In addition, he was highly regarded as an authority in patent and patent laws. His reputation as a scientist was worldwide, and there had come to him many honors during nearly half a century of his achievements.

Dr. Tone was born in the little village of Bergen, N. Y., on October 16, 1868. He obtained his early schooling at the Brockport, N. Y., Normal School and later entered Cornell University from which he graduated with the degree of mechanical engineering in 1891. Immediately after his graduation from Cornell and until 1893 he was employed as an engineer by the Thomson-Houston Electric Company at Lynn, Mass., and from 1893 to 1895 was employed in a like capacity by the Pittsburgh Traction Company. In 1895 he was engaged by the late Dr. Edward Goodrich Acheson, who four years before had created the first man-made abrasive known to industry as Carborundum. Taking advantage of the great power development at Niagara, Dr. Acheson decided to move his little plant from Monongahela, Pa., to Niagara Falls, N. Y., and Dr. Tone was engaged as plant engineer.

The story of Dr. Tone's early days of patient research in the plant of The Carborundum Company—of his successes and failures — can well be regarded as industrial romance. His work in the abrasive field and his guidance can well be said to have been an outstanding factor in revolutionizing the abrasive industry.

In 1919 Dr. Tone was elected president of The Carborundum Company and in April, 1942, he was named chairman of the board of directors. He was a member of the American Electrochemical Society, American Institute of Chemical Engineers, American Chemical Society, American Institute of Mining Engineers and Society Chemical Industry of London, England.

National Metal Congress and War Conference Displays Events

The following is a list of events to be included in the forthcoming National Metal Congress and War Conference Displays to be held in Cleveland's Public Hall the week of October 16:

October 16 to 20—National Metal Congress, National Metal Exposition. Mr. W. H. Eisenman, Director, 7301 Euclid Ave., Cleveland, Ohio.

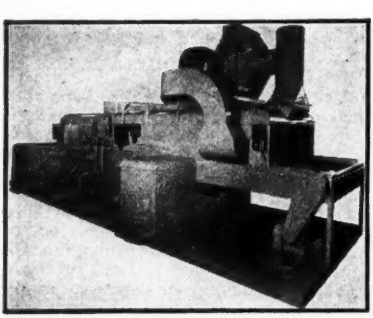
October 16 to 20—American Society for Metals, Annual Meeting. Mr. W. H. Eisenman, Secretary, 7301 Euclid Ave., Cleveland, Ohio.

October 16 to 19—American Welding Society, Annual Meeting. Miss M. M. Kelly, Secretary, 33 W. 39th St., New York City.

October 16 to 18—Iron and Steel Division and Institute of Metals Division, American Institute of Mining and Metallurgical Engineers, Fall Meeting. Mr. Frank T. Sisco, Division Secretary, 29 W. 39th St., New York City.

October 17 to 20—Society for Experimental Stress Analysis, Semi-Annual Meeting. Dr. W. M. Murray, President, P. O. Box 168, Cambridge 39, Massachusetts.

October 18 to 20—American Industrial



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Streamlined design. Recirculating hot or cold air blow off. Hidden motors, pumps and pipes are easily accessible. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Handling alkali to varsol as cleaner. Monorail, Belt, or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

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Serviced by experienced representatives assuring you of continuous production and economical operation.

Be Guided by the Experience of Industry

For better, faster, and more economical finishing Du-Lite Chemifinishes have no equal. Manufacturers who are making post war plans should consider Du-Lite Chemifinishes.

Nothing is left to chance with Du-Lite Service. We furnish proper equipment; plan its installation; supply materials; and train your own men. Is it any wonder that Du-Lite leads in popular acceptance with manufacturers who demand the best? Write, wire, or phone.

DU-LITE CHEMICAL CORP.
MIDDLETOWN, CONNECTICUT

Radium and X-Ray Society, Annual Meeting. Mr. Philip D. Johnson, Secretary, Room 1612, 23 E. Washington St., Chicago 2, Illinois.

L. J. Durney Joins Sulphur Products

The appointment of Lawrence J. Durney as chief chemist has been announced by Sulphur Products Company, Inc.,

L. J. Durney

Greensburg, Pa. A graduate of Manhattan College, New York City, with a B.S. degree, Mr. Durney has for the past two years served as plant chemist and foreman of the plating department of Remington-Rand, Inc., Propeller Division, Johnson City, New York.

In his new position Mr. Durney will devote much of his time to problems encountered in stripping copper and also to the development of special cleaning agents. Mr. Durney is a member of the American Chemical Society.

Army-Navy "E" to Norton Pike

On Friday, July 7, in the presence of many distinguished guests, the workers at Norton Pike Company, Littleton, New Hampshire (Division of Norton Company) were presented an Army-Navy "E" pennant for outstanding contribution to the war effort. This New England concern has been producing oilstones and other abrasive specialties since 1823; then, under the old Pike name; today, under the brand Norton Abrasives.

Since this country started on its defense program, the plant's output has steadily increased until now it is practically six times that of 1940. The greater portion of products manufactured has gone to the armed forces and to plants directly or indirectly serving the same. Since 1931, sales of its products in the United States have been through Behr-Manning Corporation, Troy, N. Y., another Norton division.

Rheem Acquires Atlas Steel Barrel Division

According to an announcement made by R. S. Rheem, president, the Rheem Mfg. Co., 2523 Pennsylvania Ave., Baltimore, Md., has acquired the Atlas Steel Barrell Division of Bethlehem Steel Co., Bayonne, N. J. This acquisition gives Rheem a factory in every important steel container market and brings the total Rheem plants to 14, located in nine states.

Robert Campbell, president of Atlas Steel Barrel Corp. before its acquisition by Bethlehem and since then manager of the plant, will become a vice-president of the Rheem company.

McCrory Returns to Hommel

The O. Hommel Co., Pittsburgh, Pa., has announced that James F. McCrory, Jr., is again associated with its organization. Mr. McCrory's new position as assistant to the president will be chemical expert in coordinating the company's war work and other chemical products.

Mr. McCrory was attending Washington and Jefferson College when he entered the army and served two years in World War I. After his release he worked for Eaton Rhodes & Co., of Pittsburgh and Rogers, Brown & Crocker Bros., of Pittsburgh, until 1929 when he became associated with the O. Hommel Co. In 1936 he left to become connected with the J. C. Ackermann Co., where he remained until returning to the O. Hommel Company.

Complete lines of protective coatings developed and manufactured by experienced platers. Let us send you full information.

Protect **PLATING RACKS** used in every plating cycle and in almost any cleaning operation with Miccro-Supreme Stop-Off Lacquers. Miccrolite and Miccroflex.

Protect **PLATING EFFICIENCY AND ACCURACY** by the masking of parts for hard chrome plating or selective copper plating with Miccro-Supreme Stop-Off Lacquers.

Protect **WIRE BASKETS** used in alkali washing, petroleum spirits or emulsion cleaning, and acid pickling with Miccro-Supreme Stop-Off Lacquers and Miccrolite.

Protect **ANODIZING RACKS** with Miccro-Supreme Stop-Off Lacquers, Miccrolite and Miccroflex.

Protect **NATURAL AND PLATED FINISHES** to provide resistance to sulphur dioxide, sunlight, moisture, oil, grease, gasoline and chemical fumes with Miccrolac.

Protect **PARTS AGAINST RUST OR CORROSION** whether in storage or transit with the high flash anti-rust oil, Miccroil.

Protect **COILS USED IN RUSTPROOFING SYSTEMS** with Koilkote which reduces deposits and makes them easy to remove.

MICHIGAN CHROME & CHEMICAL CO.

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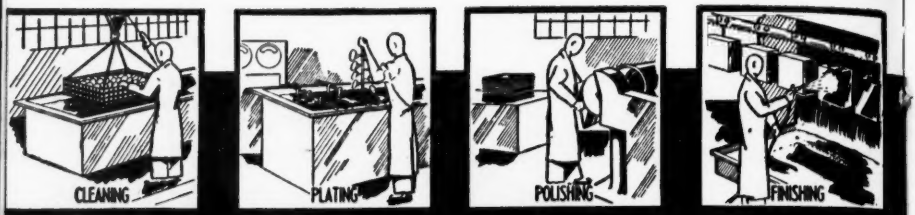


New Equipment and Materials

Udylite Dichromating Machine

The illustration herewith shows a machine for the dichromating of zinc-coated steel and die-cast parts which has been developed by The Udylite Corp., 1651 E. Grand Blvd., Detroit 11, Michigan. According to the manufacturer, the construction of the machine is based upon the discovery that absolute control of both time and temperature is vital in obtaining satisfactory finishes on workpieces.

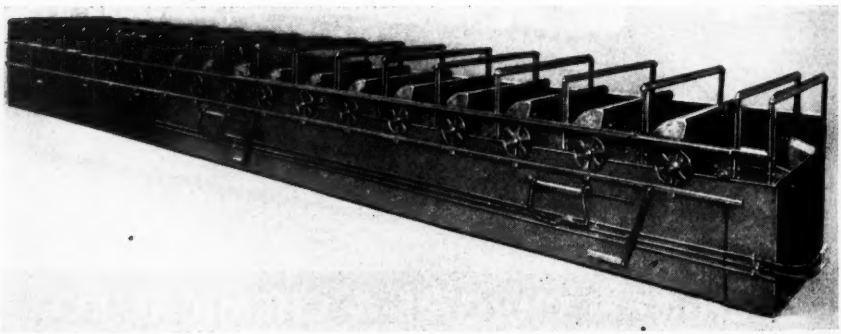
Custom built to meet any requirements, the machine is fully automatic, conveying bulk parts through a complete processing cycle by means of a split-timed dwell schedule. Parts being processed are said to be cleaned, rinsed, dipped, drained, and dried continuously without scratching or scarring.

Grip-Wax

A wax which can be sprayed on large floor areas, leaving a high-gloss non-slip finish without buffing, to be known as Grip-Wax, is announced by Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif. According to the manufacturer, the anti-skid safety qualities of the material ensure firm footing on all types of floors.

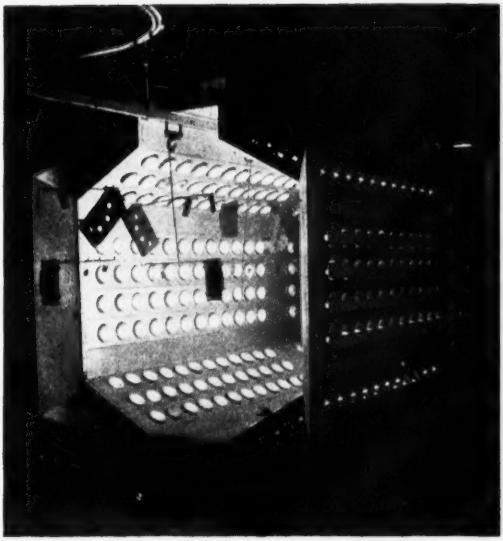
Grip-Wax is a free-flowing liquid which can be easily applied with a light wiping motion or by atomizing spray, and sets in a few minutes to a non-tacky, lustrous finish. Solvent action on asphaltic tile, rubber, or linoleum is said to be eliminated.

Grip-Wax is designed to seal floor pores and joints again water penetration, and is said to have unusual resistance to constant traffic blows.



Udylite Dichromating Machine

Hall Infra-Red Radiant Heating Oven



"Ebonol-C" Blackening Process

Known as the "Ebonol-C," a blackening process which, it is claimed, will produce a stable, adherent, non-reactive, cupric oxide coating on copper and copper alloys that provides for excellent adhesion of lacquers, paints, and enamels under severe weathering conditions is announced by The Enthone Co., 443 Elm St., New Haven 2, Conn. The inert nature of the Ebonol-C coating is said to prevent reaction between the coating and the organic finish.

The finish obtained is nap-like in nature, presenting a relatively absorbent base for the paint to be anchored. The Ebonol-C Blackening Process is said to be suitable for treating copper alloys containing from 60 to 100 per cent copper. The lower copper allows are colored a mahogany brown, and alloys containing more than 65 per cent copper are colored black. The Ebonol-C finish, therefore, is said to be unsuitable as a base for clear lacquers or for one coating of white pigmented lacquer due to its dark color.

The finish is applied by simple immersion of the work in a dilute solution of the salts operated near 210 deg. F. The treating time is approximately 10 minutes.

Hall Infra-Red Radiant Heating Oven

The Hall Infra-Red Radiant Heating Oven illustrated herewith, product of the C. M. Hall Lamp Co., 1035 E. Hancock St., Detroit 7, Mich., is especially designed for the baking of finishes on office furniture. The oven can be used in baking finishes on various shapes and sizes of sheet metal ware, such as filing cabinets, cabinet drawers, desk drawers, desk equipment, and office chairs.

Of completely enclosed, prefabricated panel construction, the oven may be used either as a batch or a conveyorized heating system. Flexibility is obtained by circuiting the lamps along length and height of the oven.

H-VW-M "Fotopor" Paper

A test paper for detecting porosity in plated coatings, to be known as "Fotopor," is announced by the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

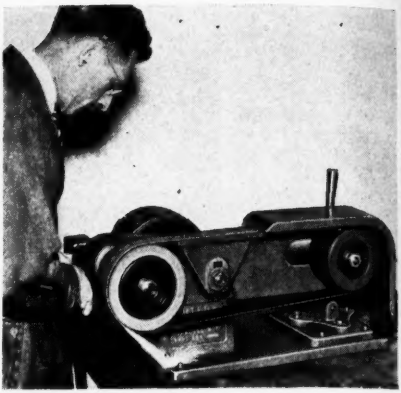
Fotopor Paper is particularly recommended for determining the porosity of nickel deposited on iron and steel. However, it can also be used to test the porosity of chromium, copper, brass, and tin over iron and steel, as well as the porosity of these same materials over copper and brass. Blue spots will appear on the paper wherever iron or steel is exposed, and brown spots in the case of copper and brass.

H-VW-M Fotopor Paper is furnished in convenient rolls 2 inches wide comprising 150 lineal feet and providing a

total surface area of approximately 3,600 square inches. The rolls are compact (approximately 4 inches in diameter), easy to handle, and are packed in individual cardboard boxes.

Porter-Cable Model BBS Bench Type Belt Grinder

Addition of a bench type grinder, designated as the Model BBS, to its line of abrasive belt grinders is announced by The Porter-Cable Machine Company, 300-7 Wolfe St., Syracuse 8, N. Y. Ruggedly constructed to provide for vibration-free operation, the machine utilizes an endless metal-cutting abrasive belt 2½ inches wide x 60 inches long which operates at 4,500 s. f. p. m. and is driven by a 1 h.p motor.



Porter-Cable Model BBS Bench Type Belt Grinder

The design of the Model BBS bench grinder provides a flat bed grinding area 2½ x 8 inches as well as a soft resilient contact wheel 7 inches in diameter x 2½ inches wide which is adaptable for grinding all types of metal. The machine can be used with wheels from 6 to 8 inches in diameter.

According to the manufacturer, the Porter-Cable Model BBS Bench Type Belt Grinder is ideally suited for burring gears, weld grinding, generating radii, removing flash, cleaning-up and polishing workpieces. The machine can be furnished with or without motor.

ROLOCK

PROCESSING CARRIERS

Misfit handling equipment for metal parts is costly, hazardous; increases spoilage. Play safe . . . obtain custom-built baskets, trays, crates, racks, fixtures, etc., designed for your specific jobs by Rolock. All sizes, styles, to 6000 lb. capacity. Maximum resistance to exposures . . . low hourly costs.

Stainless Steel Pickling . . . Degreasing Basket

NEW CATALOG ON REQUEST

ROLOCK, INC.

1400 Kings Highway East, Fairfield, Conn.

Cyclodiene and Percyclodiene

Two types of rust preventatives have been released by the Technical Processes Division, Colonial Alloys Company, Philadelphia, Pa. Actually, the two products are metal-cleaning solvents which leave protective films that prevent rust and tarnish. They are identified by the names Cyclodiene and Percyclodiene.

Both products are used as short-time simple immersions at room temperature and are used in an open tank made of

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"MGC" ELECTROPLATING EQUIPMENT

Write for Interesting Details TODAY!

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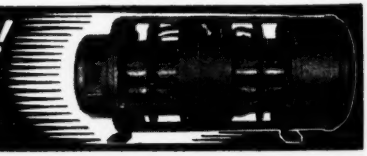

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TIN

AMERICA'S war production record is astonishing. This amazing production performance stands as a monument to the ingenuity and resourcefulness of America's industries.

The plating industry has done a praiseworthy job in keeping pace with this continuously accelerated production schedule. The combined contributions from established sources of research and from the experiences of actual "shop" plating, have contributed greatly to the plating industry's ability to make sudden and unusual production changes.

Harshaw Anodes and Chemicals have been in the thick of the fight from the start . . . and the reason . . . for more than 50 years Harshaw has made it their job to concentrate on improving the quality of Harshaw Anodes and Chemicals.

SEND FOR

- **32 page book listing Industrial Chemicals**
- **72 page price list of Laboratory Chemicals**

HARSHAW

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

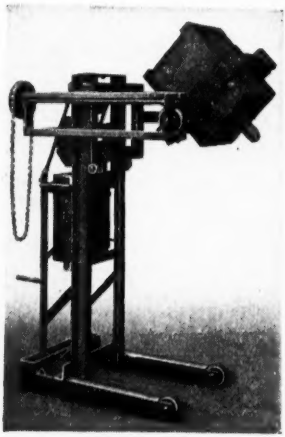
metal, glazed ceramic, or other material. It is claimed that neither will attack metals, as they are neutral and contain no acids, alkalies, or water.

Cyclodiene films dry in about 20 minutes, leaving rust-inhibited clean surfaces for a short time thereafter. Percyclodiene films will remain for about 30 days, leaving rust-inhibited clean surfaces for quite some time thereafter.

A quick dip into either one of these rust-inhibitive solvents, prior to or between inspection and final finishing operations, is said to protect the work from rust and corrosion. Penetration is excellent, and protection is afforded to threaded parts, joints, interstices, and crevices.

Revolvator Carboy Dispenser

The Revolvator Carboy Dispenser illustrated herewith, product of the Revolvator Co., North Bergen, N. J., is designed for use in safe and convenient pouring of acids from carboys.



Revolvator Carboy Dispenser

To use, the dispenser is wheeled into such a position as to straddle the carboy on the ground. By turning the roller in front of the carboy, clamps are tightened around the carboy through heavy screws until it is firmly held. The turning of a crank then

SOLVE YOUR SPEED-UP PROBLEM WITH A

Write today for full data on how *you* can adopt the LUPOMATIC DEBURRMASTER equipment for deburring parts for the duration and for post-war plans, saving 85% of your finishing cost.

LUPOMATIC TUMBLING MACHINE CO., INC.
4510 BULLARD AVE. BRONX, N. Y.

THE OUNCE OF PREVENTION WORTH POUNDS OF CURE!

NU-LITE { **PLASTIC SLEEVES GLOVES *and* APRONS**

• Low cost, light weight protection can boost production in your shop. Only 1/7th the weight of ordinary protective items—NU-LITE gloves, aprons and sleeves mean worker comfort . . . help control dermatitis induced by industrial irritants. Plastic fabric has remarkable resistance to water, oils, gasolines, acids, alkalis, degreasing and plating solutions. Write for prices, samples, complete information.

NU-LITE MANUFACTURING COMPANY
DEPT. PF ***Plastic Development Consultants*** **VERONA, N. J.**

Continuous Supplies . . .

CALL FOR MOUNTING DOLLARS

Official U. S. Coast Guard photo

. . . . STEP UP YOUR PAY ROLL PLAN

Official U. S. Marine Corps photo

War is a continuous job.

Ever-widening, ever-advancing fighting fronts call for a never-ending flow of manpower and matériel—financed by a continuous *flow of money.*

Your responsibility as top management increases with the mounting tide of battle. So keep this one salient fact before you at all times: *The backbone of our vital war financing operation is your Pay Roll Savings Plan.*

Your job is to keep it constantly revitalized. See to it that not a single new or old employee is left unchecked. See to it that your Team Captains solicit everyone for regular week-in and week-out subscriptions. And raise all percentage figures wherever possible.

Remember, this marginal group represents a potential sales increase of 25% to 30% on all Pay Roll Plans.

Constant vigilance, in a quiet way, is necessary to keep your Pay Roll Savings at an all-time high. Don't ease up—*until the war is won!*

Back the Attack!

SELL MORE THAN BEFORE!

The Treasury Department acknowledges with appreciation the publication of this message by

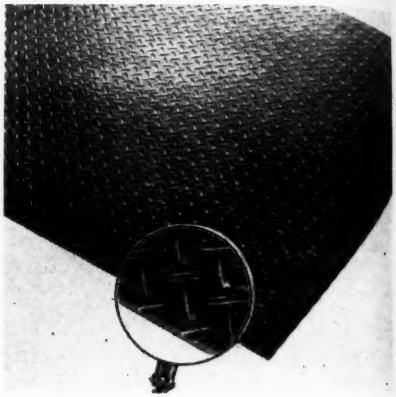
PRODUCTS FINISHING

This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.

provides for the quick elevation of the carboy to the desired height, where it can be tilted slowly by rotating chain driving through worm mechanism. The carboy is held in desired position until moved again by the chain. After emptying, the carboy is returned to an upright position and gently lowered by the standard deadman brake lever, which is the same handle as is used for elevating the carboy.

"Ameritred" Matting

Known as the "Ameritred," a solid plastic friction type of matting which is made by firmly binding friction compound together with a plastic is now being marketed by American Mat Corp., 1796 Adams Street, Toledo 2, Ohio. The matting is designed to lie flat and to afford a non-slip surface.



"Ameritred" Matting

Jet black in color, the Ameritred Matting is available in 29 x 63 x 9/64-inch, easily handled and easily cleaned sheets. To fit smaller or odd shaped areas, the matting can be trimmed accordingly. The matting is said to be so constructed that swelling due to exposure to various types of oils is reduced to a minimum.

"Flatjet" Spray Nozzle

Designed for use wherever a sharp, flat hard-hitting spray is needed, the "Flatjet" Spray Nozzle shown here has a wide variety of industrial applications. Among the jobs for which this nozzle is especially adapted are industrial washing and degreasing, descaling operations and various chemical process spraying operations.

The Flatjet Spray Nozzle is built without cores, vanes or other obstructions, depending solely on design to produce the desired spray pattern. Standard nozzles are made of brass, steel, or stainless steel one-piece constructions. Nozzles may also be made of other materi-

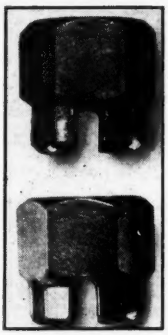
Burring Problems Solved with Roberts Compounds

Today, as never before, dependable burring compounds are needed to speed up production.

Illustration shows metal parts before and after the use of Roberts Compounds on a wire or tampico wheel. Roberts Compounds provide the following advantages:

- **A good smooth ground.**
- **Preserve all required dimensional edges on complex metal parts.**
- **Rapid and economical production.**
- **Eliminate burrs and breaking of edges.**

If you have any buffing problems, write in for samples and suggestions.



TOP, BEFORE
BOTTOM, AFTER

ROBERTS ROUGE CO.
STRATFORD • CONN.

For a real good polishing job use

KEYSTONE EMERY

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* **4316 Paul St., Phila., Pa.**

Do your designers know **FLOCK?**

Let us furnish them samples and data on this "material of 1,000 uses."

FUNCTIONAL

Used in airplane, auto and numerous other industries for —

SOUND DEADENING • TEMPERATURE INSULATION • INTEGRAL GASKETS • SHOCK-ABSORBING SURFACE • NON-MAR SURFACE PROTECTION.

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Applied in various lengths and colors to wood, paper, cloth, metal, etc., the following effects are produced —

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REQUEST SAMPLES AND PRICES

RAYON PROCESSING CO. OF R. I., INC. • **65 TREMONT STREET CENTRAL FALLS, R. I.**

"ROBINSON'S ASSAYED"

Gold Plating Solutions

Are Nationally Endorsed

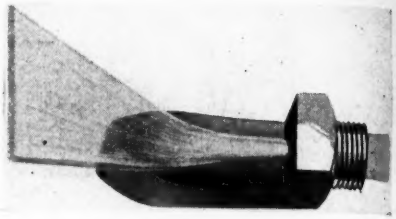
MADE BY A. Robinson & Son
131 CANAL ST. NEW YORK

als as the needs of the application dictate.

A flat spray, with sharply defined edges and uniform distribution, is delivered by the Flatjet Nozzle. All surfaces coming in contact with the liquid sprayed are accurately machined. A wide range of Flatjet nozzle sizes are available for performance to meet given specifications.

For example, in spraying water at 40-lb. pressure, a choice may be made of twenty different Flatjet nozzles. These range in capacity and spray angle from 1 g.p.m. and a 15-deg. spray angle to 20 g.p.m. and a 35-deg. spray angle.

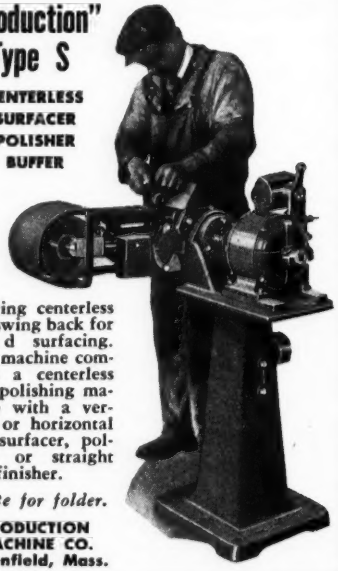
Flatjet Spray Nozzles may be used with water, brine, oil and liquids of similar viscosities. They are manufactured by Spraying Systems Co., 4015-21 West Lake St., Chicago 24, Illinois.



"Flatjet" Spray Nozzle

"Production" Type S

CENTERLESS SURFACER POLISHER BUFFER



Showing centerless feed swing back for hand surfacing. This machine combines a centerless feed polishing machine with a vertical or horizontal belt surfacer, polisher or straight line finisher.

Write for folder.

PRODUCTION MACHINE CO.
Greenfield, Mass.

"Pro-Tek" No. 2 Hand-Protective Cream

A water-resisting hand-protective cream for workers whose jobs bring them into contact with water-soluble cutting oils, dilute acids, alkalies, and other water-chemical mixtures is announced by Finishes Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Delaware.

Known as "Pro-Tek" No. 2, the cream is a companion to the original "Pro-Tek," a greaseless product which is said to provide protection against paints, lacquers, grime, grease and insoluble cutting oils. The new cream is intended for operations where water is present and the standard water-soluble Pro-Tek unsuitable.

A important advantage claimed for

FOR CONTROLLED, EFFICIENT PICKLING

WRITE

THE WM. M. PARKIN CO., • Highland Bldg., Pittsburgh, Pa.

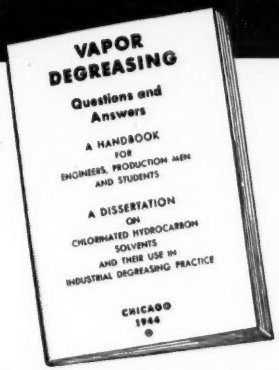
NEP-ACID INHIBITOR—To Control Acid Action on Clean Metal

SUMFOAM PICKLING COMPOUND—To Control Fumes

"THOSE PERFECT PARTNERS FOR PICKLING"

New Complete Manual on VAPOR DEGREASING

Solves Metal Cleaning Problems



If you are concerned with industrial solvents and degreasing in any way—you will find this new book a source of much valuable practical information. It is the last word on the rapidly growing field of Vapor Degreasing—an unbiased, factual presentation of the subject. Written by a leading metal-cleaning engineer, in clear, concise question and answer form—this illustrated handbook takes up every phase of vapor degreasing including: Types of work that can be handled by vapor degreasing, recovery of solvents, toxicity, degreasing of bowl-shaped parts, proper size of degreasers, special uses for degreasers, and many other problems.

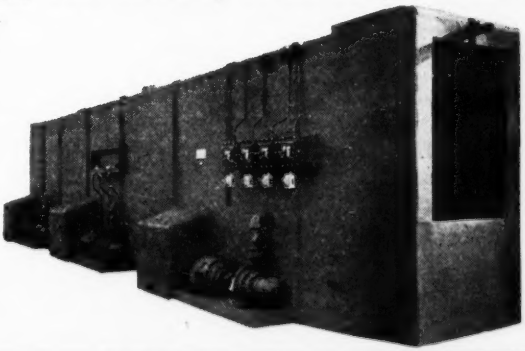
SEND FOR FREE COPY Send in your name and address today, and a copy of the VAPOR DEGREASING Manual will be sent to you entirely FREE—without any obligation. Also ask for latest Phillips Catalog of Vapor Degreasing equipment and solvents.

PHILLIPS MFG. CO., 3495 W. Touhy Ave., Chicago, Ill.

HOWARD WASHING MACHINERY for Shells, Rockets, Bombs

This monorail wash and double-rinse machine is one of a large variety of production machines built by HOWARD for many different types and sizes of shells, rockets and bombs.

Used in many of the nation's largest plants for between-process washing and pre-finishing, these HOWARD machines are unequalled for the quality and quantity of their output. Send us sample parts for processing — you'll gain new insight on how to obtain more profitable production cleaning and finishing. Catalog on request.



HOWARD ENGINEERING & MFG. CO.
1056 Hulbert Cincinnati 14, Ohio
Metal Cleaning and Finishing Machinery

Pro-Tek No. 2 is that it protects against a number of chemicals and thus eliminates the necessity of separate creams for each particular need. The cream is applied to the hands and arms before starting work, forming a flexible, slightly greasy film which acts like an invisible glove. One application is said to last from three to four hours and may be removed by using an industrial hand cleanser or washing in hot water with a mild soap. Neutral in reaction and non-irritating, Pro-Tek No. 2, according to the manufacturer, contains a high percentage of lanolin, which closely resembles the natural oils of the skin.

SOL-KLEAN
for
Better Paint Adhesion
INDUSTRIAL CHEMICAL PRODUCTS CO.
DETROIT 7
Milwaukee **Fort Wayne**

INDUSTRIAL GLOVES

Synthetic Coated
FABRIC LINED
Knit Wrist and Gauntlet Styles
FOR MEN and WOMEN
EDMONT MFG. CO.
509 Orange St.
Coshocton, Ohio

"Tectyl"

A polar compound which is said to provide a means for cleaning and preserving metal and metal products of all types, to be known as "Tectyl," is now being produced by the Valvoline Oil Co., Cincinnati, Ohio. Due to the polar nature of this compound, the preservative qualities vary directly in proportion to the electrical conductivity of the substance to be preserved. Thus, Tectyl is said to provide maximum protection against the rusting of iron, steel, copper, magnesium, and other metals capable of conducting electric current.

The compound is available in five different types, designated as Tectyl 515, 511, 502, 506, and 508. All compounds are homogeneous in nature and are said to flow readily at ordinary temperatures. Each compound includes two major elements; namely, a solvent which evaporates, and the active polar compound which remains as a protective coating or film that can be easily removed. According to the manufacturer, the film deposited by Tectyl compound is sufficiently transparent so that the formation of any corrosion of the metal under the film after protection period has passed can be detected without prior removal of the film.

Each of the Tectyl liquids may be applied by use of a spray, by dipping, by brushing, or by flushing the metal surface to be protected. All compounds are said to be soluble in such solvents as kerosene and carbon tetrachloride, as well as in ordinary lubricating oils.

Tectyl 515 is designed for use in cleaning metal and for providing a film which affords lubricating qualities and temporary protection against corrosion. Tectyl 511 is used to prevent contact of water with metal in order to eliminate corrosion. Where machinery or metal parts

BIONOL--Cleaner and Degreaser
REMOVES OIL, GREASE, SMUT, GRIME, DRAWING AND BUFFING COMPOUNDS. **BIONOL** LEAVES A CHEMICALLY CLEAN SURFACE. **BIONOL** IS NON-TOXIC, NON-CAUSTIC, NON-CORROSIVE, NON-INFLAMMABLE AND HARMLESS TO THE SKIN.
BIOFEN LABORATORIES ● **14 Sixth Street, Bridgeport 7, Conn.**

Add a Rich Velvet or Suede Effect to Your Product, at Low Cost . . .

Coating the interior and bottom of silver chests is but one example of how Cellusuede Flock can beautify a product, protect its contents and provide a non-scratching base.

Easily applied to wood, metal, glass, paper or cloth. Variety of rich colors. Write for color card, prices and samples.

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FLOCK

CP
Cellusuede Products, Inc.
ROCKFORD, ILLINOIS

Bridgeport
BUFFING LATHES

FOR EASY OPERATION—INCREASED OUTPUT

Specially suitable for buffing and polishing large work requiring plenty of room to swing. 10 H. P. AC motor. Ball bearing, high carbon steel spindle of large diameters accurately balanced. Variable spindle speed.

Straight front allows ample foot room. Improved lubrication system. Many other improvements that go to make it a profitable investment for any metal finishing department. Catalog on request.

No. 17M HEAVY DUTY *Other types for other needs*

THE BRIDGEPORT SAFETY EMERY WHEEL CO., INC., BRIDGEPORT, CONN.

have been immersed in water, direct application of Tectyl 511 is said to remove the water and provide a temporary anti-corrosive covering.

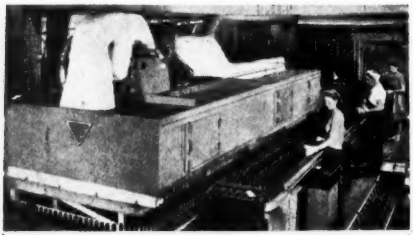
Tectyl 502 — a metal preservative designed for use on parts or machines stored indoors—is said to leave a permanent film of such strength as to provide preservation against corrosion on metal surfaces which are not subject to weathering or heavy abrasion. Tectyl 506 is designed for use on parts or machines stored outdoors, leaving a slightly heavier and thicker film than that deposited by Tectyl 502. Tectyl 508 is used to prevent rust formation on parts such as bearings, internal combustion engines, and the like, where lubrication is a factor.

Detrex Cleaning Booklets. A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants and describes typical designs of degreasers has been published by Detrex Corporation, 13017 Hillview Ave., Detroit 27, Mich., under the title of "Solvent Degreasing and Effective Methods of Conserving Chlorinated Solvents."

"Detrex Triad Alkali Cleaners," an eight-page booklet, describes in detail alkali and emulsion cleaning compounds developed by Detrex for all types of metal cleaning jobs. It also covers the many uses and applications of alkali cleaning materials in aircraft, automotive, railroad, metal fabricating, and other industries. Copy of either or both booklets free upon request.

S. V. W. Technical Bulletins. Standard Varnish Works, Staten Island, N. Y., has issued the first of a series of technical bulletins for finishing technicians, designers, engineers, and all others interested in specific purpose industrial products finishes.

The first of these bulletins is devoted to "Rockloid" Baking Enamel, a non-alkyd synthetic with many desirable qualities. A convenient folder for filing the bulletins is sent with this first bulletin. Requests for the bulletin should be made on business letterheads and addressed to Mr. M. L. Corbin, Sales Manager, Industrial Div., Standard Varnish Works, 2600 Richmond Terrace, Staten Island, New York.



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• From largest conveyors to smallest test units, Despatch finish baking ovens are engineered to give fast, even baking at low cost. All types and sizes to suit your requirements, using gas, oil, electric or steam heaters.

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Specialist and consultant on metals, finishes and processes. Industrial background. Ability to use his knowledge in application of our specialized materials which are essential in production, processing and maintenance fields. Headquarters New York, some traveling. Address reply to Box 567, Church Street Annex, New York P. O., New York.

PLATING FOREMAN WANTED

For mid-south shop doing chrome, bright nickel, zinc. Unusual opportunity for good man. In answering give particulars. Address reply Box No. 91, care of PRODUCTS FINISHING, 431 Main St., Cincinnati 2, Ohio.

OPEN TIME

Open Time Automatic Conveyor, Dipping and Baking 350° Fahrenheit, Punch Press, Automatic Silk Screen and Roller Coating Machines, Full laboratory control.

AMERICAN DECALCOMANIA CO., INC.
4334 W. 5th Ave., Chicago **Kedzie 8144**

USS Cyclone Metal Conveyor Belt Catalog No. 3. The Cyclone Fence Division, American Steel and Wire Co., Waukegan, Ill., has published a 24-page profusely-illustrated catalog which fully covers the constructive features, specifications, applications, and so on, of the various types of USS Cyclone "Red Tag" Conveyer Belts offered by this firm. Copy of Catalog No. 3 free.

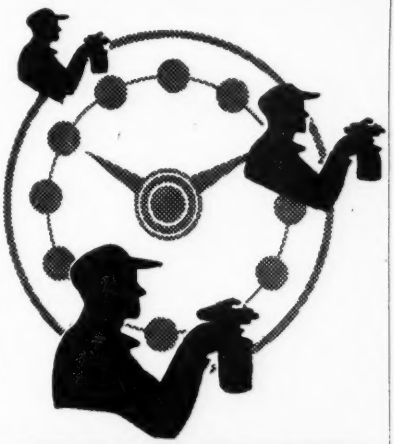
Open Steel Grating and Stair Treads. A 24-page catalog containing information on open steel grating and stair treads has been issued by the Wm. F. Klemp Co., 6601 S. Melvina Ave., Chicago 38, Ill. The catalog is profusely illustrated with photographs showing uses of riveted and welded types of grating for open steel flooring, stairways, stair treads, fire escapes, loading platforms, wash racks, drains, catwalks, tower-stairs, and so on. Copy free upon request.

"Three-Dimensional Seeing, the Science of Color and Light For Better Vision in Industry," is the title of a booklet now being made available by the Du Pont Company Finishes Division. The third publication offered since this system of applying color to improve industrial seeing conditions was announced before the Illuminating Engineering Society in 1941, this 20-page booklet contains information derived from color-conditioning installations in more than a thousand plants. Recent results of a continuing Du Pont research program are stated for plant management, maintenance, and safety engineers.

Also included in the profusely color-illustrated brochure is a section devoted to the "Safety Color Code for Industry," a corollary to "Three-Dimensional Seeing." The Color Code recommends as a standard the use of specific color signals and symbols to denote specific hazards and safety equipment.

Photographs—many of them paired as "before-and-after"—show how contrasting colors increase production, reduce injuries, and improve morale in machine shops, factories, and so on. Several statements from major companies that have adopted "Three-Dimensional Seeing" are also published in the booklet, copies of which may be obtained from the Finishes Division, E. I. du Pont de Nemours & Co., Wilmington 98, Del.

PAINTERS PUT MORE TIME IN WHEN PAINT SMELL IS TAKEN OUT



Ridsmel
STOPS PAINT SMELL
Instantly!

Get 60 minutes of production out of every painting hour — with Ridsmel. A few drops in a gallon of paint sweep away every sickening trace of paint smell — in swift seconds! Ridsmel is used in shipyards and industrial plants everywhere. Safe; effective in any paint, varnish, enamel.

SEND FOR TEST BOTTLE
Good for 100 Gallons of Paint
$3 Prepaid

Holly Chemical Co.
126 E. 25th St.
New York 10, N. Y.

COMMENDED
PARENTS' MAGAZINE
CONSUMER SERVICE

The Finishing Touch — **By J. A. Patterson**

"You and your dates! Why don't you spend a dime once in a while for a real shine?"

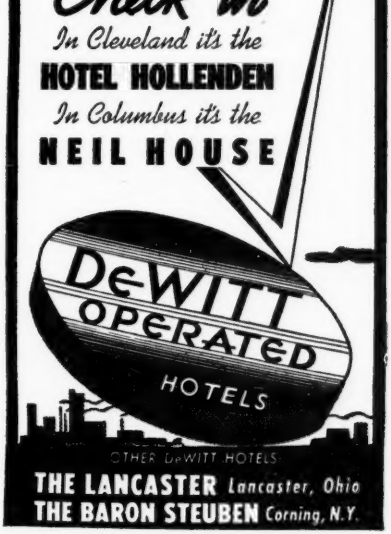
Cottonleather Fabric. Designed primarily for the product engineer, a four-page technical catalog which fully describes Cottonleather fabric—a new abrasion-resistant plasticized fabric—has been published by the Southern Friction Materials Co., P. O. Box 1475, Charlotte 1, N. C. Cottonleather is recommended for application wherever an abrasion-resistant and durable fluidproof, heat-resistant, heavy duty fabric is desired. Copy of catalog free upon request.

Allis-Chalmers V-Belt Drive Equipment. Each of the various V-belts, sheaves, and drives comprising the line of V-belt drive equipment offered by Allis-Chalmers, Milwaukee 1, Wis., is described in a "quick-picture" bulletin released by this firm. Five special kinds of Allis-Chalmers Texrope V-belt—each designed for a special type of protection — are reviewed. The new type Allis-Chalmers Magic-Grip Sheave and the four speed changing methods employed in connection with Allis-Chalmers sheaves are also discussed in the bulletin. Copy of Bulletin B6331 free upon request.

Chemicals Wanted

The National Registry of Rare Chemicals, Armour Research Foundation, 33rd Federal and Dearborn Sts., Chicago 16, Ill., has issued a new list of chemicals for which the Registry would like to find sources of supply. These are as follows:

Ammonium salts of alkoxy acetic acids (alkyl groups of 7-9 carbons).
o,o′—Diphenylamine dicarboxylic acid (10g).
Ethyl, methyl linoleate.
Grey tin (0.5-1g).
Guaiacol camphorate.
Lead persulfate.
Lignoceric acid.
1—Isopropyl naphthalene—2—sodium sulfonate.
Methyl azide.
Mellitic acid (100g).
8—Mercapto quinoline.
1, 2—Dimethyl — 3, 6 — dihydroxy benzene.
Penta brom ethane.
Sym bis acetyl acetone.
1—Methyl—4—isopropyl—2, 5—Dihydroxy benzene.
Trichlor ethanol.
Vinyl crotonate.



CUT DOWN REJECTS
WITH
ORVUS
IN YOUR METAL CLEANING BATHS
This sulfated fatty alcohol Cleansing Agent is EFFECTIVE
—as a surface tension lowering agent
—as an emulsifier
—in dispersing lime soaps which might cause poor plating results if permitted to deposit on the metal
Write for further information about Orvus to
PROCTER & GAMBLE, Cincinnati, Ohio

CATALOGS

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Dual Heat Ovens
The advantages of the design of Dual Heat infra-red ovens, coordinated with Jensen Conveyors, are outlined in an eight-page bulletin available from Jensen Specialties, Inc., 12151 Grand River Ave., Detroit 4, Michigan.

2. Temperature Controls
Special self-operated temperature controls for degreasing and cleaning machines are the subject of Bulletin 650 available from Sarco Company, Inc., 475 Fifth Ave., New York 17, New York.

3. Buffing Compositions
Frederic B. Stevens, Inc., Larned and Third Sts., Detroit 26, Mich., is now distributing Catalog No. 27, which describes the various buffing and polishing compositions manufactured by this firm. It also contains valuable data on polishing, buffing, deburring and cleaning.

4. Vapor Degreasing
A handbook of questions and answers on the subject of vapor degreasing, written especially for engineers and production men, has been published by Phillips Manufacturing Co., 3494 W. Touhy Ave., Chicago 45, Illinois.

5. Fire Extinguisher Maintenance
"Inspection and Maintenance of First Aid Fire Extinguishers" is the title of a helpful, practical manual which is written in non-technical language the plant foreman or fire chief can easily understand. Walter Kidde & Company, 445 Main St., Belleville, New Jersey.

6. Cleaning and Finishing
A data book which contains important information on the design and applications of Howard metal cleaning and finishing machinery has been prepared by Howard Engineering & Mfg. Co., 1056 Hulbert St., Cincinnati 14, Ohio.

7. Surface Preparation Methods
A six-page report on specialized Oakite surface preparation methods for ferrous parts which are to be bright zinc plated has been issued by Oakite Products, Inc., 20 Thames St., New York 6, New York.

8. Conveyors for Infra-Red Layouts
The use of conveying systems in infra-red drying and baking operations is graphically described in Bulletin 150 issued by Gifford-Wood Co., 429 Lexington Ave., New York, New York.

9. Solvent Degreasing
A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants and describes typical kinds of degreasers has been published by Detrex Corp., 13017 Hillview Ave., Detroit 27, Michigan.

10. Lead Plating
Harshaw Chemical Co., 1945 E. 97th St., Cleveland, Ohio, has available a bulletin which describes lead plating with Harshaw fluoborate lead solution concen-

trate—suggested uses, solution preparation, equipment and procedure.

11. Solvent Vapor Degreasers
A 24-page catalog which describes the many standard and special applications of Blakeslee Degreasers and their economical operation has been prepared by G. S. Blakeslee & Co., Cicero 50, Illinois.

12. Rodine
A standard control for fast, efficient, economical pickling — "Rodine" — is the subject of a descriptive folder now available from the manufacturer. American Chemical Paint Co., Ambler, Pennsylvania.

13. Industrial Ovens
The Kirk & Blum Manufacturing Co., 2816 Spring Grove Ave., Cincinnati, Ohio, has prepared an informative booklet on the various types of industrial ovens designed and installed by this company to meet individual requirements in product finishing.

14. Anodes and Plating Chemicals
Data on nickel, brass, copper, zinc, cadmium, tin, lead and silver anodes, and anodes for chromium plating, are given in Bulletin AC-105 prepared by Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

15. Black Oxide Finish
Data on Du-Lite Black Oxide Finish for steel parts is provided in a folder which is available from Du-Lite Chemical Corp., Middletown, Conn. A variety of steel parts, Du-Lite finished, are illustrated.

16. Baking Enamels
Standard Varnish Works, Industrial Div., 2600 Richmond Terrace, Staten Island, N. Y., has issued a bulletin containing technical data on a non-alkyd baking enamel known as "Rockloid."

17. Washing and Drying Machines
The line of modern equipment for washing, rinsing, slushing and drying designed and built by Industrial Washing Machine Corp., 290 Burnet St., New Brunswick, N. J., is the subject of a 12-page bulletin now available for distribution.

18. Emulsion Cleaning
The Enthone Co., 442 Elm St., New Haven, Conn., has issued a bulletin on the Enthone emulsion cleaners which are designed for rapid cleaning of all types of basis metals without attack.

19. Alum-O-Paste
A four-page folder describing a composition of aluminum oxide together with a special binder for fast cutting and polishing operations is now being distributed by Roberts Rouge Co., Stratford, Connecticut.

20. Promat Process
Promat Division, Poor & Co., 851 S. Market St., Waukegan, Ill., is distributing a booklet which covers the Promat Process, a new and different process for the electrodeposition of metals.

21. Zinc Plating
A group of articles on cyanide zinc and bright zinc plating, prepared by experts on the Turco staff, is available in bulletin form from Turco Products, Inc., 6135 S. Central Ave., Los Angeles, California.

22. Polishing Machine
Literature on the No. 101 centerless feed polishing machine for cylindrical work, which requires no centering, no chucking, no holding, is available from Production Machine Company, Greenfield, Massachusetts.

Print plainly in filling out coupon for literature.

PRODUCTS FINISHING
431 Main St., Cincinnati 2, Ohio

I am interested in receiving the following literature reviewed in your September issue.

No..... No..... No..... No..... No.....,
(Insert numbers denoting literature you want.)

Name ..... Title.....
Company .....
Company Address .....
City ..... State.....

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PUBLISHED BY GARDNER PUBLICATIONS, INC.

431 MAIN STREET • CINCINNATI • OHIO

Products Finishing

CLEANING

PLATING

POLISHING

FINISHING

SEPTEMBER • • 1944

2 big guns in the war against fungus

ROXALIN 71-2202A AIR DRY LACQUER

THOUSANDS OF PIECES of communication equipment are protected against moisture and fungus attack on our far flung tropical fronts by a post-assembly coat of Roxalin 3314. Easy to apply by dip, spray or brush, this one-coat air dry lacquer meets Signal Corps specification, 71-2202A. Not only does the finish prevent infection of the surface by micro-organisms but actually provides a zone of inhibition around the coated areas. If any spots are missed, a certain amount of protection is still present.

ROXALIN'S FUNGUS-RESISTANT THERMOSETTING CLEAR

MAKERS OF COMPONENT PARTS of equipment destined for tropical service are more and more turning to Roxyn-11c-200391 for fungicidal protection. In addition to its fungicidal properties, which meet the same high standards as the air dry lacquer, this thermosetting finish has unusual arc resistance, moisture resistance and high dielectic strength. Especially noteworthy is the stability of the fungicidal agent through the heat ranges necessary to curing.

ROXALIN *flexible* FINISHES

INCORPORATED

ELIZABETH, NEW JERSEY

Cleaning BEFORE BRIGHT ZINC PLATING

6-PAGE FREE REPORT ON SPECIALIZED OAKITE SURFACE PREPARATION METHODS

WHEN ferrous parts are to be given a bright zinc plated finish, the first and VITAL step is thorough removal of grease, dirt and other foreign matter. Surfaces MUST be CHEMICALLY CLEAN to insure a uniform, lasting finish.

WHETHER you are presently using a still or soaker tank, an electro-cleaning tank, an automatic mechanical washing machine or a combination of any of these, you will find Oakite degreasing and cleaning materials rapidly remove grease, machine oils, drawing lubricants, stamping compounds and other deposits. Fast working, they do the job thoroughly, safely . . . leave surfaces unharmed.

Send for Your FREE Copy

When you write for your FREE copy of this helpful publication, tell us your PARTICULAR problem. Let us give you the benefit of our wide knowledge on proper surface preparation before ALL finishing operations.

OAKITE PRODUCTS, INC., 20 Thames St., NEW YORK 6, N. Y.

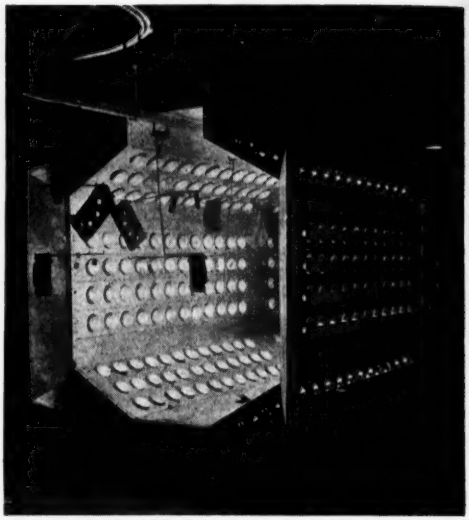
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE MATERIALS . METHODS . SERVICE

CLEANING FOR EVERY CLEANING REQUIREMENT

Expertly Engineered . . .
. . . to solve your heating problem

HALL INFRA-RED RADIANT HEAT OVEN



For the baking of finishes on office furniture. The oven is designed to bake the finish on varied shapes and varied sizes of sheet metal ware, such as: filing cabinets, cabinet drawers, desk drawers, desk equipment and office chairs. The oven may be used either as a batch or a conveyorized heating system. Flexibility is obtained by circuiting the lamps along the length and height of the oven.

The C. M. Hall Lamp Company has engineered practical innovations in the field of infra-red radiant heating which have become standard in the design of infra-red ovens as a production tool. Among such advances are:

COMPLETELY ENCLOSED OVENS PERMITTING FULLEST USE OF HEAT—BOTH RADIANT AND DERIVED CONVECTED HEAT, ASSURING BETTER TEMPERATURE CONTROL.

PREFABRICATED PANEL CONSTRUCTION — SIMPLIFYING ERECTION AND REDUCING OVERALL COST.

REMOVAL OF ALL VITAL PARTS (WIRING, LAMP BASES, AND SOCKETS) FROM THE HEAT ZONE TO OUTSIDE THE OVEN WALL.

POSITIVE VENTILATION CONTROL THROUGH THE USE OF EITHER A RECIRCULATION OR AN EXHAUST SYSTEM.

These exclusive Hall features are built into infra-red equipment employing radiant heat sources varying from 250 watts to 1000 watts.

C. M. Hall Lamp Company invites your questions as to how Infra-Red Radiant Heating Equipment can solve your heating problem

HALL

C. M. HALL LAMP CO.

1025 HANCOCK AVE.
DETROIT 7, MICHIGAN

Infra-Red Radiant Heating

H-VW-M BRIGHT ALLOY PLATING PROCESS

(Copper—Tin—Zinc Alloy)

The new H-VW-M Bright Alloy Process produces deposits composed of copper, tin and zinc. It is novel in that anodes of the same composition as the deposit have been perfected—thus, the metal concentration of the bath remains practically constant. The alloy deposit has chemical and physical properties totally unlike any of the component metals. The unique combination of properties inherent in this alloy coating make it superior for many applications to any commonly deposited metals or alloys.

The outstanding deposit characteristics are:

- **Silvery white deposits**
- **Bright as taken from the plating bath**
- **High tarnish resistance**
- **Superior corrosion protective value when deposited on many metals and alloys**
- **Solders easily with non-corrosive flux**
- **Hard and abrasion resistant**
- **Non-magnetic, relatively high electrical conductivity and low contact resistance**
- **Low internal stress permitting forming of plated articles**
- **Ability to plate over or be used as an undercoating in combination with many other metals.**

The outstanding solution operating characteristics are:

- **Low solution cost—common chemicals used**
- **Throwing power superior to any commonly used plating solution**
- **Good deposit distribution**
- **Simple thickness determination**
- **Lighter deposits required to obtain equivalent protection and wear resistance**
- **Can be barrel, still or basket plated**
- **Control by analytical methods**

H-VW-M engineers are ready to answer your inquiries regarding this new process and to study its application to your problems and operations. Write today for latest technical information.

Manufacturers of a complete line of electroplating and polishing equipment and supplies

HANSON-VAN WINKLE-MUNNING CO.

MATAWAN, NEW JERSEY

PLANTS: Matawan, New Jersey · Anderson, Indiana · Bridgeport, Connecticut

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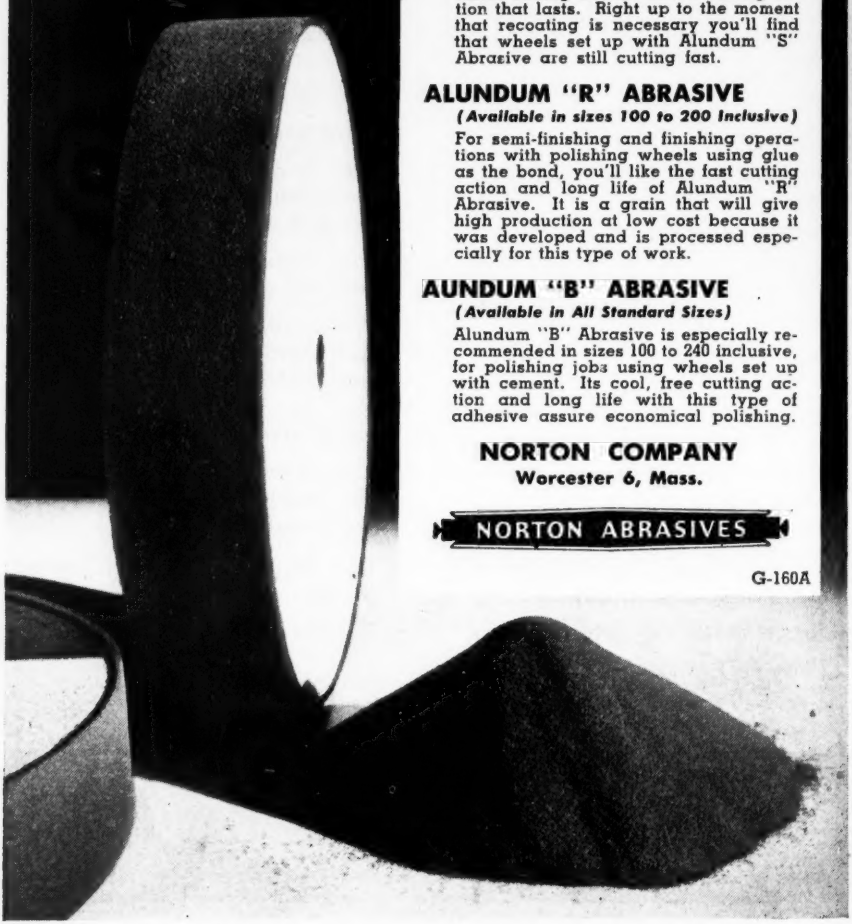
HANSON-VAN WINKLE MUNNING CO. MATAWAN NEW JERSEY U.S.A.

The Right Type of Abrasive for Every Polishing Job...



ALUNDUM "S" ABRASIVE

(Available in sizes 90 and Coarser)

Its special surface treatment give grains with better sticking power but also a faster cutting action—and a cutting action that lasts. Right up to the moment that recoating is necessary you'll find that wheels set up with Alundum "S" Abrasive are still cutting fast.

ALUNDUM "R" ABRASIVE

(Available in sizes 100 to 200 Inclusive)

For semi-finishing and finishing operations with polishing wheels using glue as the bond, you'll like the fast cutting action and long life of Alundum "R" Abrasive. It is a grain that will give high production at low cost because it was developed and is processed especially for this type of work.

AUNDUM "B" ABRASIVE

(Available in All Standard Sizes)

Alundum "B" Abrasive is especially recommended in sizes 100 to 240 inclusive, for polishing jobs using wheels set up with cement. Its cool, free cutting action and long life with this type of adhesive assure economical polishing.

NORTON COMPANY

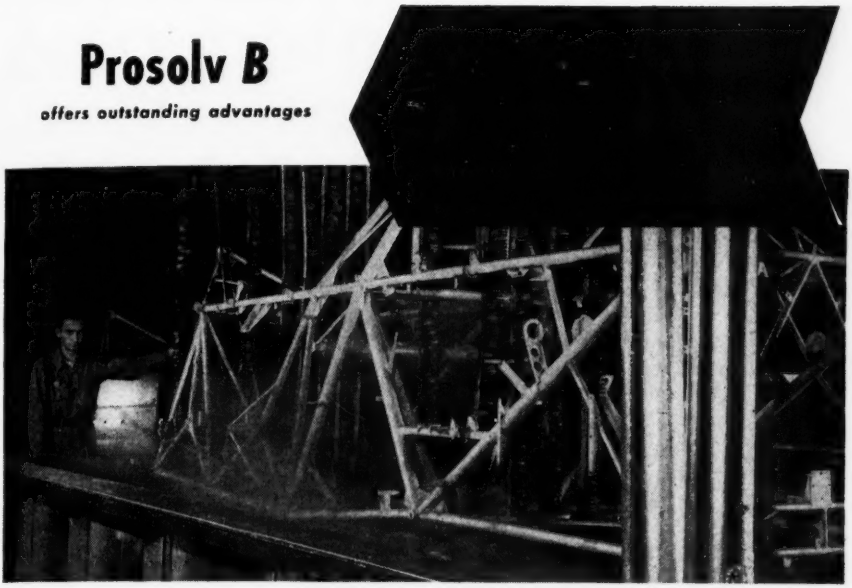
Worcester 6, Mass.

NORTON ABRASIVES

G-160A

Prosolv *B*

offers outstanding advantages



Approved for The Bullard-Dunn Descaling Process

Equally effective in still tank and electro-cleaning

So positive are the advantages of Turco Prosolv *B* that prominent electroplaters have switched to this new cleaner immediately following tests *although they had considered satisfactory the materials they had been using.*

Turco Prosolv *B* insures the chemical and physical cleanliness that is essential to 100% bonding to steel of zinc, cadmium, chromium and other plate. It removes every trace of oil, grease, smut, paint and rust preventive compound. It contains no soap; leaves no deposit. Rinsing is complete, even though parts may have dried.

A highly concentrated product, Turco Prosolv *B* is 100% active. Every particle works; there is no waste.

As this new cleaner is effective in both still tank and electro-cleaning, it simplifies stocking and plant procedure where both processes are employed.

Try Turco Prosolv *B* for stripping tin deposits formed during The Bullard-Dunn Descaling Process. A standard cleaning tank may be used for this.

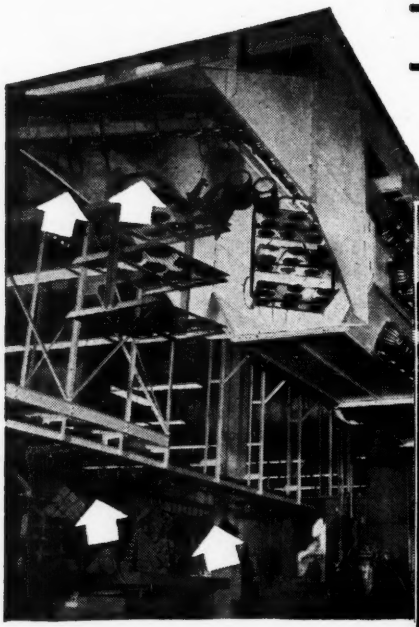
Call the Turco Field Service Man for details on this specially formulated electro and still tank cleaning material which is doing such a notable job the nation over. Write for Bulletin PF9.

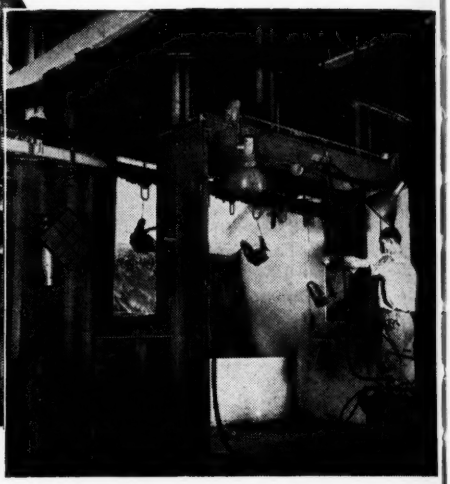
TURCO Turco

INDUSTRIAL CHEMICAL COMPOUNDS

TURCO PRODUCTS, INC. *Main Office and Factory:* 6135 S. Central Avenue, Los Angeles 1 • 1606 Henderson St., Houston 10, Texas • 125 W. 46th St., Chicago 9, Illinois • *Stocks in All Principal Cities*

PLANNED CONVEYING
—Cuts Work Travel
—Permits Processing in Transit





Gifford-Wood Offers Advisory Service . . . as well as Conveyor Systems

In the plant shown above G-W engineers worked with the factory engineers and designers in making material handling equipment part of the original plans. Thorough experience in varied processing developments—first-hand knowledge in meeting material handling needs for over 130 years—give added authority to Gifford-Wood's advice on Planned Conveying.

Write for a G-W Engineer to consult on a system to fit your plant operations. Ask for Bulletin 150-V.

5757-P

GIFFORD-WOOD CO.

FOUNDED 1814

New York 17, 420 Lexington Ave. HUDSON, N. Y. Chicago 6, 565 W. Washington St.

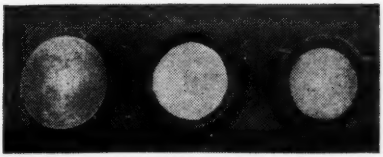
HEADQUARTERS FOR INFRA-RED BAKING AND DRYING

After 11 months' test in sulfuric acid pickling Monel Rods show 3 to 1 strength advantage

The best measure of a tie-rod's merit is its ability to keep a pickling tank tight after a period of service.

This requires high corrosion resistance to maintain (1) the strength of the rod and (2) the structure of the threads on the end.

The illustration shows a cross-section of three metal rods . . . Monel, and two other metals frequently used in pickling . . . tested by the Research Department of a large steel mill after 11 months' service.



Monel *Metal "A"* *Metal "B"*

The rods, 1" diameter by 18" long, were bolted through a wooden rack and tested under actual plant conditions in a tank used for pickling hot-rolled sheets. The sulfuric acid content of the pickle was maintained at from 5% to 7% by weight. The operating temperature was 180° F.

After a total exposure of 331 days, or 2448 hours actual pickling time, metals "A" and "B" showed serious deterioration with only a residual core of the original metal remaining (see photos). The Monel rod had remained smooth, and was only slightly discolored. Load tests revealed that the Monel rod had over 3 to 1 strength advantage. The strength of rods "A" and "B" had been seriously impaired.

MAXIMUM LOADS SUSTAINED BY SPECIMEN TIE-RODS AT END OF TEST

Metals	*Maximum Load* (Average of 4 or more rods)
Monel	52,800 lbs.
Metal "A"	15,300 lbs.
Metal "B"	14,500 lbs.

The condition of the threads was noted and measurements made. At the critical point on the threads *ahead* of the nut, rods of metals "A" and "B" suffered attack that destroyed their usefulness. The Monel rod showed no significant attack at this vital spot, thus maintaining its full usefulness.

Tough, strong and highly resistant to corrosion, Monel showed in these tests, as it has in other tests and in years of practical service, that it is uniquely fitted for long-lived pickling equipment.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street **New York 5, N. Y.**

★ ★ ★ ★ **INCO NICKEL ALLOYS** ★ ★ ★ ★

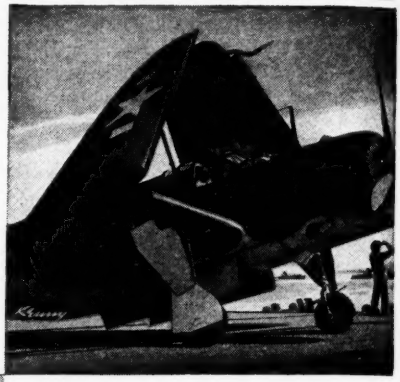
MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • "Z" NICKEL • NICKEL
Sheet . . . Strip . . . Rod . . . Tubing . . . Wire . . . Castings

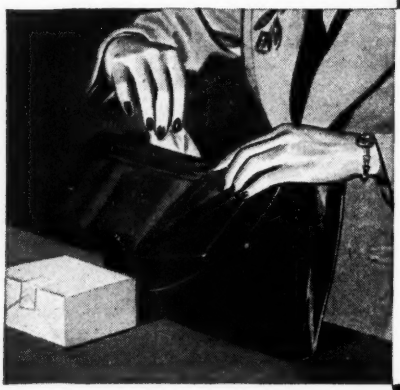
Do you know...?

Q. The wings on this plane have been:

☐ Shot off ☐ Unhinged for repair
☐ Folded back to save space

A. Folded back to save space. When pushed out into flying position again, wings are attached to fuselage with steel pins. Certain parts of these pins must be electro-plated with chromium. Many plane manufacturers today use a special Permacel tape in "masking" sections of vital parts during electro-plating.





Q. The lining on this post-war handbag will probably be made of:

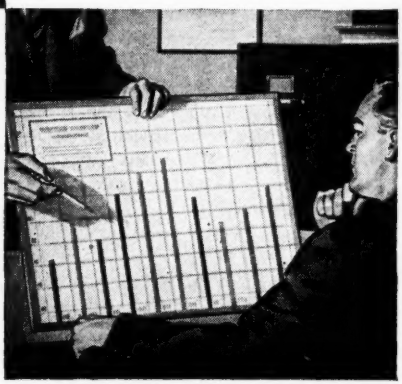
☐ Cloth ☐ Leather ☐ Coconut fibre

A. Cloth. And after the war, as before, manufacture of handbags will be greatly speeded by use of Permacel cloth tape (Jonflex). Operator assembles sections of "liners," sticks them together with Permacel, then puts bag through sewing machine as a unit. Eliminates need for holding separate sections in position manually—saves time—cuts costs.

Q. This quick-reading production chart was made with:

☐ Colored paper ☐ Colored tapes
☐ Colored pencils

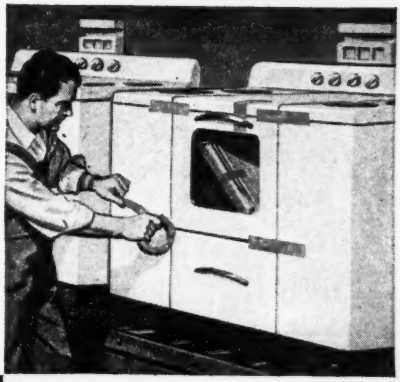
A. Chart was made with Permacel's companion, Texcel Cellophane Tape, which is made in a variety of colors, as well as in a transparent form. Colored Texcel tape is also used to identify fuel lines and wires. Transparent Texcel has many office uses—mends torn letters and ledgers, seals packages, eliminates all fuss with glue and strings.



Quiz on timely production short-cuts—No. 6

Q. Prior to shipment, stoves are usually taped in order to:
☐ Protect parts ☐ Identify models
☐ Keep moisture out

A. Protect parts. Stove pictured has been taped with Permacel cloth tape (Jonflex) to hold burners and grates in place, prevent doors from opening, keep trays from rattling. Today this tough, clean-stripping Permacel tape is also used to seal shell canisters, signal flares and many other ordnance items.



Q. What's this man doing?
☐ Leveling earth ☐ Laying mines
☐ Searching for mines

A. Searching for mines. In newest U. S. land mines, Permacel moisture-proof cloth tape (Utilitape) plays an important part. After the war, manufacturers whose products must be able to withstand corrosion will find this Permacel tape unequaled for moisture resistance combined with extreme flexibility.

Q. Which of these types of pressure-sensitive tapes can help speed and improve *your* production?
☐ Paper ☐ Cloth ☐ Cellophane
☐ Metal ☐ Glass

A. All of these types of Permacel tapes are today used in war production. Many war uses will prove helpful in your business when you return to post-war work. Meantime, our research laboratory facilities are available to you for development of special tapes to meet war or post-war needs.

Permacel

Industrial Tapes

INDUSTRIAL TAPE CORPORATION

New Brunswick, N. J.

Makers of Texcel Tape

HERE'S THE "BEGINNING OF THE END" OF YOUR FINISHING PROBLEMS

In the new Globe Tumbling Barrel Catalog, partially illustrated above, you will find the final solution to your finishing problems. It contains complete information about the nine different types of Globe Barrels in their various sizes and capacities. You will find that there is a Globe Tumbling Barrel for almost every type of finishing operation—de-burring, burnishing, polishing, painting, japanning, or drying. All of them are designed to provide finer finishing at less cost. This new catalog plus Globe's Finishing Service Department are waiting to serve you. Write today!

Here Are Seven Ways That Globe Tumbling Barrels Will Reduce Your Finishing Costs

1. You can process thousands of pieces at one time.
2. You do not need specially skilled labor.
3. One man can operate several barrels simultaneously.
4. The purchase price of Globe barrels is low.
5. You have practically no upkeep.
6. Your operating expense is mainly power consumption which is negligible.
7. You obtain superior results.

THE GLOBE
MACHINE AND STAMPING CO.
CLEVELAND 2, OHIO

HUPP MOTOR CAR CORP.

Are you still using

BLACK NICKEL PLATING?

Then consider EBONOL-C . . . a new blackening bath . . . a definite advancement in metal finishing art

Now on the job in some 300 progressive warwork plants

ORIGINATED and PERFECTED by ENTHONE

Produces a deep, rich, protective coating on copper and copper alloys

Oiled Ebonol-C withstands 200 hours Salt Spray Test

Fast Production . . . Only 10 minutes per batch for coating 70% to 100% copper alloys at low operating temperature of 210°F.

BLACK NICKEL	VS	ENTHONE EBONOL-C
1 Requires undercoating for corrosion protection		1 Produces coating with *high* corrosion protection
2 Coatings are GREY		2 Coating is JET BLACK
3 Coatings tend to flake . . . weak mechanical cohesion		3 Highly adherent and withstands severe mechanical deformation
4 Poor bases for painting . . . structural weakness		4 Excellent base for painting . . . absorbent surface with toothy nap
5 Evolve ammonia gases when heated		5 No gases evolved when heated
6 Solution difficult to control . . . needs close attention		6 Simplicity itself. Requires NO current, NO [illegible]nsive supervision

Write today for sample o[illegible] for [illegible] demonstration

THE ENTHON[illegible] 4[illegible] [illegible] New Haven 2, Conn.

PATENT PENDING

ENTHONE

EBONOL-C

BLACKENING PROCESS *for Copper and Copper Alloys*

ARE YOU USING SILVER?

If you are, then you know the problem of tarnishing. The leading firms in many lines of industry are preventing tarnish by the quick, sure and economical method of using

PALLITE
TRADE MARK

PALLADIUM PLATING SOLUTION

Whether you are making jewelry or doing precision work for radar or electronic parts, PALLITE has solved the problem of tarnishing; let us tell you about the experience of firms in your industry who are using PALLITE successfully and economically.

Ask today for more information

PRECIMET LABORATORIES

Division of GEORGE C. LAMBROS

Research and Development in Precious Metals

64 Fulton Street New York 7, N. Y.

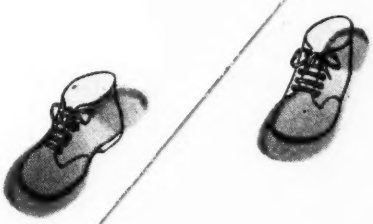
"BAREL-CEL"

A handy, 2 gallon unit for plating small parts.

SIMPLE • DURABLE • ECONOMICAL

Write for folder

IMPORTANT FIRST STEPS



To Great Developments!

BEFORE full strides in production are possible, every product must pass through the first painstaking steps of laboratory research and pilot plant testing. Success at these critical stages of development depends much upon fine or "special" chemicals of unvarying quality and purity. While only small amounts may be required at first, *large quantities* are often necessary for full scale manufacture.

The furnishing of such fine and "special" chemicals for industry is a familiar and widely-known service of the Baker & Adamson Division of the General Chemical Company.

. . . Baker & Adamson has long been recognized for the exceptionally high standards of purity maintained in the manufacture of its laboratory reagents and fine chemicals. Today new and expanded facilities *increase still further its capacity for producing such chemicals in industrial quantities!*

Why not plan now with Baker & Adamson and be sure of having the fine or "special" chemicals for every step of your product development when you need them?

GENERAL CHEMICAL COMPANY

Fine Chemicals for Industrial America

GENERAL CHEMICAL COMPANY
40 RECTOR STREET, NEW YORK 6, N. Y.

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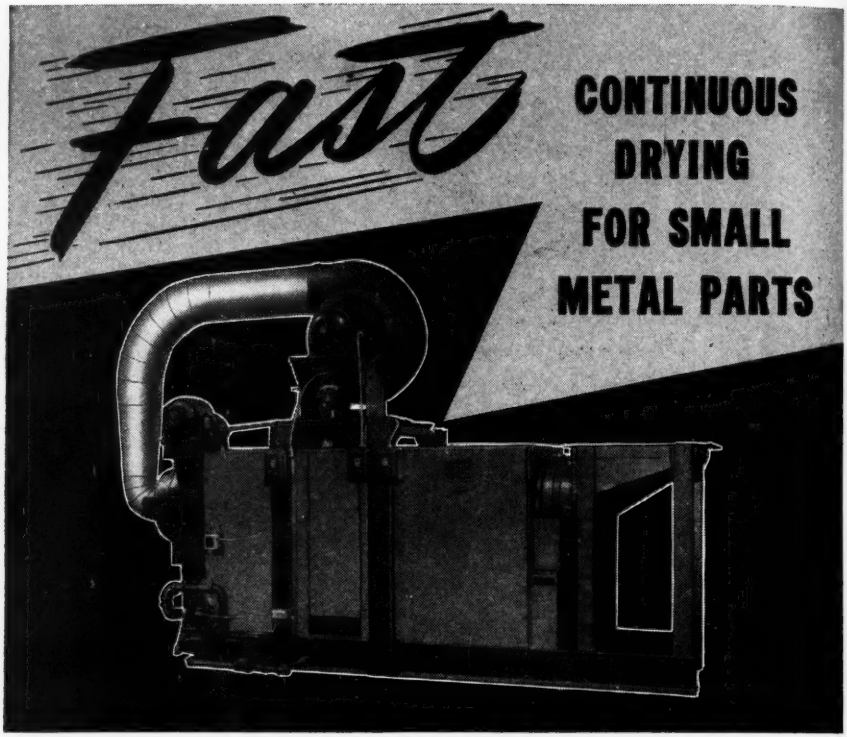


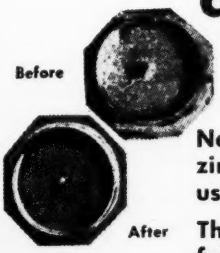
Revolving-type Colt Autosan Model 271 speeds-up small parts drying. Hopper-fed automatically at controlled rate, the parts are agitated by rolling cylinder and subjected to a blast of heated air from motor-driven blower. The result is thorough drying at a rate from 50 to 100 cubic feet of parts per hour.

Model 271 has an extra powerful blower and, for normal production, is equipped with steam coils for heating of air. For especially difficult drying needs or exceptionally high production a power gas burner can be supplied to meet additional heating requirements.

There is a standard model Colt Autosan that will handle almost any combination of washing, rinsing and drying operations you need. Special models are available for unusual requirements. Colt-manufacture has always been an assurance of efficient performance and long life. Write for catalog, describe your problem and we will suggest the machine best suited to your needs. Address: Colt's Patent Fire Arms Mfg. Co., Autosan Division, Hartford, Connecticut.

COLT AUTOSAN METAL PARTS CLEANING EQUIPMENT

IRIDITE*
and see the Difference



Use This New Chromate Coating for Zinc or Cadmium Surfaces

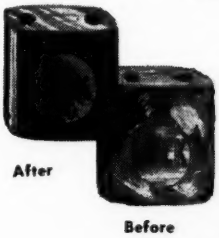
No matter what you are manufacturing, if you use zinc or cadmium it can be made to last longer by the use of this simple IRIDITE corrosion resistant process.

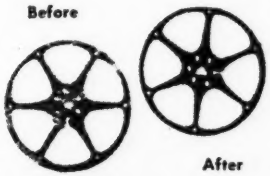
The IRIDITE process greatly improves the field of usefulness of zinc and cadmium as protective coatings, making it possible to use these metals for plating, as castings or stampings, under conditions of exposure that would ordinarily mean rapid deterioration.

Special Features

- **Will never pile up or form adhesions.**
- **Can be twisted or formed without chipping or flaking.**
- **Can be rinsed in hot water and centrifuged immediately.**
- **Forms a good protective base prior to painting.**

***Represented in New England exclusively by MAC DERMID INC.**



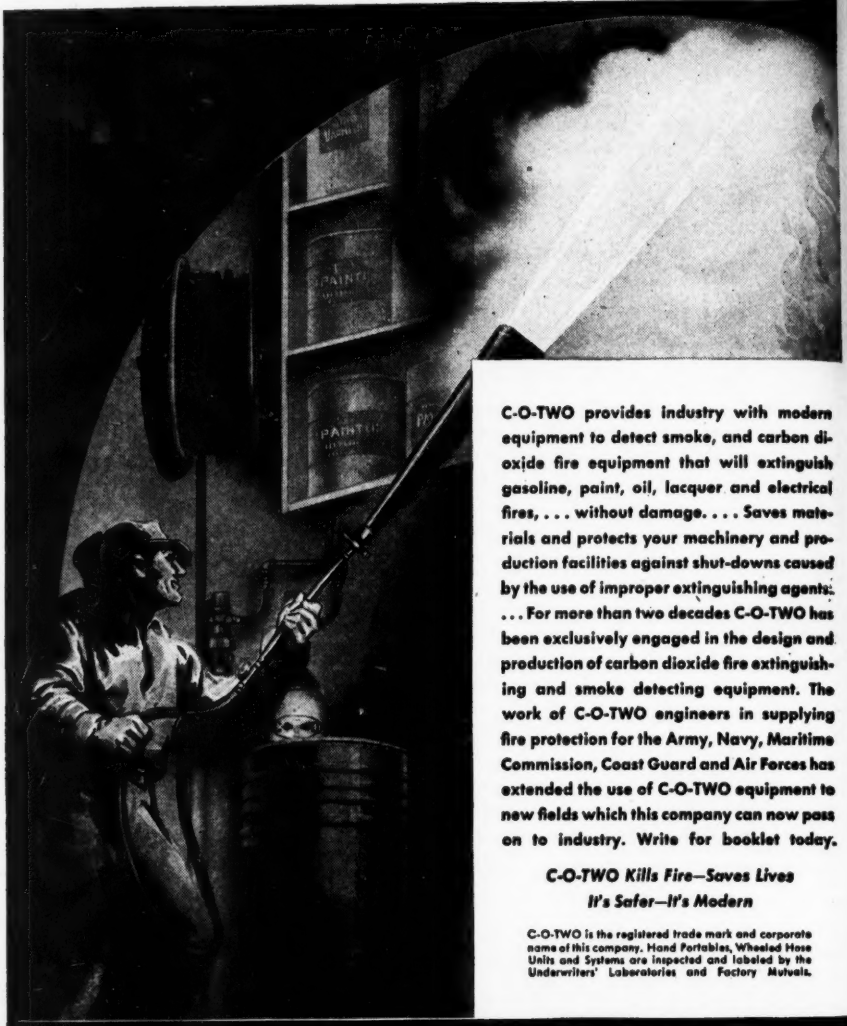


MAC DERMID
INCORPORATED
WATERBURY 88, CONNECTICUT

WRITE ONE OF THESE SERVICE ORGANIZATIONS FOR FREE DEMONSTRATION

NEW YORK	CHICAGO	DETROIT	CLEVELAND	ST LOUIS	TORONTO—CAN
Udylite Corp (L I City)	Udylite Corp Geo A Stutz Mfg Co	Udylite Corp Wagner Bros	Udylite Corp McGean Chem Co	LaSalle, Incorporated	Clark Industrial Supplies Co

Water, **NEVER** *sub-zero gas,* **YES!**—*without damage*



C-O-TWO provides industry with modern equipment to detect smoke, and carbon dioxide fire equipment that will extinguish gasoline, paint, oil, lacquer and electrical fires, . . . without damage. . . . Saves materials and protects your machinery and production facilities against shut-downs caused by the use of improper extinguishing agents. . . . For more than two decades C-O-TWO has been exclusively engaged in the design and production of carbon dioxide fire extinguishing and smoke detecting equipment. The work of C-O-TWO engineers in supplying fire protection for the Army, Navy, Maritime Commission, Coast Guard and Air Forces has extended the use of C-O-TWO equipment to new fields which this company can now pass on to industry. Write for booklet today.

C-O-TWO Kills Fire—Saves Lives
It's Safer—It's Modern

C-O-TWO is the registered trade mark and corporate name of this company. Hand Portables, Wheeled Hose Units and Systems are inspected and labeled by the Underwriters' Laboratories and Factory Mutuals.

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1, NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

We're ready for BOTH Great Offensives

Our first concern today is production for the great military offensive and complete victory over the Axis powers.

But after Victory another great offensive will be required by industry. This will be the vital job of converting and maintaining production for peace. To keep production at the high levels essential to a stable economy will require all the ingenuity and resourcefulness which can be mustered.

In the field of product finishing Glidden is prepared to keep pace with industry's needs. Finishing developments designed to speed production of war material will bring revolutionary advances in peacetime application. Many of these Glidden developments are already being field tested for postwar production. These include precision formulations of finishing materials for use with modern conveyors, controlled humidity and temperature baking equipment and infra-red baking.

Glidden's experience and research is available to you in solving present or postwar finishing problems. Just drop us a line.

THE GLIDDEN COMPANY • Cleveland 2, Ohio

TIME-TESTED

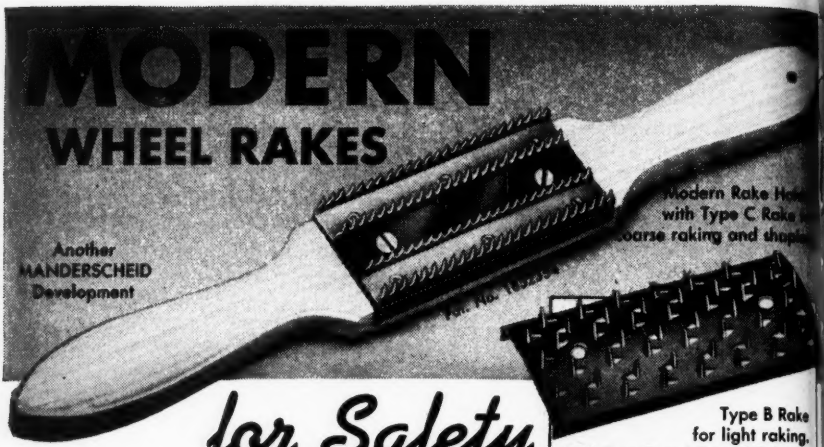
AXS-1167
ETHYLCELLULOSE PROTECTIVE STRIPPING COMPOUND

A plastic compound for preventing corrosion of metal surfaces. Its effectiveness has been proved in the protection of machined parts during storage and shipment. With variations, such as transparency, has great postwar possibilities in the metal industries for indefinite preservation of metal surfaces—particularly machined parts.

Write for details on specific applications.

GLIDDEN *Pacemaker in Paints*

MODERN WHEEL RAKES



Type B Rake for light raking.

Both Type B and Type C Rakes fit the Modern Rake Holder, singly or one on each side. Just replace worn rakes and save the handle.

for Safety Speed and Economy

Proper wheel surfaces and correct shapes are essential to efficient polishing, buffing and burring. That's why Modern Wheel Rakes *effect economies beyond estimation!*

Modern Rakes do the job right—*quickly without hazard to operator.* They recondition and shape wheels with minimum waste, *thereby conserving the wheels.*

Observe the many teeth of uniform length and spacing, patterned to rake evenly to the correct depth. Note the two rakes—Type B for light raking, Type C for coarse raking and shaping—*both interchangeable on the Modern Rake Holder,* affording the *right tool* for the job in a jiffy.

Whether it's *trimming polishing wheels,—raking out buffing wheels,*—or *shaping any kind or size* of Polishing Wheel, Buffing Wheel, or Bob, Modern Rakes *do the job so much better there's no comparison.* The *extra Safety alone* makes Modern Rakes worth *many times* their modest cost.

Jobbers in principal cities.

Presto POLISHING WHEEL BUSHINGS

Modern as **RADAR**

STOP Spindle Wear

Keep Wheels Concentric

Easily pressed into the wheel using a polishing lathe spindle as a screw press.

Another MANDERSCHEID Development

A girl can change Presto-Equipped Polishing Wheels easily, quickly and SAFELY. They slide on and off with the spindle stopped, without hazard to operator or wear to spindle.

The wheels stay concentric — do a better job faster, without wasting grit.

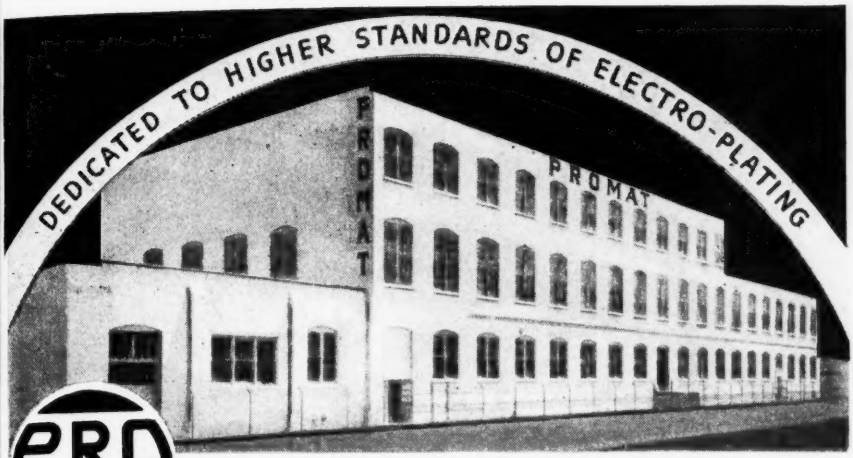
Use Presto Bushings in your present wheels. Specify "Equipped with Presto Bushings" when you order new wheels.

Send for free samples. Give spindle size.

The MANDERSCHEID *Co.*

605 West Washington St., Chicago 6, Illinois

Serving the Metal Finishing Trade over 35 Years.



PRO MAT

TRADE MARK REG.

produces the finest Plated Products!

In our Waukegan home pictured above production of Promat equipment and electrolytes is on a large scale to keep pace with the ever growing use of the Promat Process.

Promat has enabled plants, many flying the "E" Award, to increase their plating efficiency and quality of their war production.

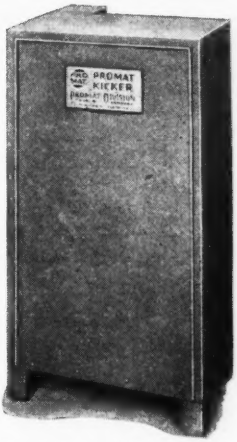
Promat plates high current areas with practically no danger of burning—with uniform color over entire area of product—has exceptional adherence and better penetration.

Promat has greater covering power, wider plating range, and produces smooth deposits. Promat produces these results in less time, with less effort, at lower production cost.

Promat is now doing its full share of war work. For postwar use, Promat Processes for other metals will have the same superior Promat characteristics.

Why not adopt the Promat Process in your plant? Promat installation is simple and can be accomplished with little effort in minimum time.

Send samples of your product for Promat Processing in our pilot plating plant for your inspection and tests. Important! A new booklet, No. 20P, describing the Promat Processes, with pictures of our new plant, is on the press. May we send you one?



The Promat Kicker is a single phase, series circuit superimposition unit, designed to provide high amperage alternating current for the Promat Process. The Kicker has complete voltage regulation for the range required by the process, and is a rugged, high safety factor machine. There are no moving parts or other replaceable elements, and the machine will operate for years at its rated capacity.

PROMAT DIVISION, Poor & Co.

851 SOUTH MARKET STREET, WAUKEGAN, ILL.

Distributors:

C. F. R. Sales Co., 262 Laurel Ave., Kearny, N. J.

Crown Rheostat & Supply Co., 1908 Maypole Ave., Chicago, Ill.
Wagner Bros., 1249 Holden Ave., Detroit, Mich.

Egyptian Announces

METL-PRIME is a new product now offered by Egyptian after exhaustive prove-up tests. As its name indicates it is a primer for metal.

Sprays on or Dips.

Air-dries dust free in 5 minutes; to handle, 10 minutes; to practical hardness, 20 to 30 minutes.

Gives hard adhesive satin finish — no sanding needed before lacquer or other top coating.

METL-PRIME won't lift. It won't bleed through even a white lacquer enamel top coat.

This new Egyptian product possesses all the inherent quality of the Egyptian line. Meets today's need; fits admirably into post-war tomorrow.

THE EGYPTIAN LACQUER MANUFACTURING COMPANY
ROCKEFELLER CENTER, NEW YORK 20, N. Y.

EGYPTIAN
SPECIALIZED PRODUCTION FINISHES

ZAPON DIVISION

CABLE ADDRESS ZAPONRICH

ATLAS POWDER COMPANY
STAMFORD CONNECTICUT

September 1, 1944

To Our Customers:

War production goes on top speed, but with the imminent collapse of Germany, we will have to apply our efforts to reconversion. We must guide our research to meet your problems.

We have accumulated valuable experience in making war product finishes. We have made and continue to make studies of new raw materials for product finishes. We have developed new methods of formulation, processing, etc.

The course of our work, however, must be guided by what you will need as the finish on your product after military outbacks take effect. I have had frank answers from many manufacturers to my question, "What Do You Consider the Most Important Post-War Finishing Problem?" As a result of these answers, we have already formulated and tested a number of new finishing materials.

It may be that by telling us what you need, you can tap this increasing knowledge, particularly on your own operation, which may help point out the direction for our further developments.

Other manufacturers are now working with us. Why don't you? I'd like to put you in touch with a qualified member of our staff.

Very truly yours,

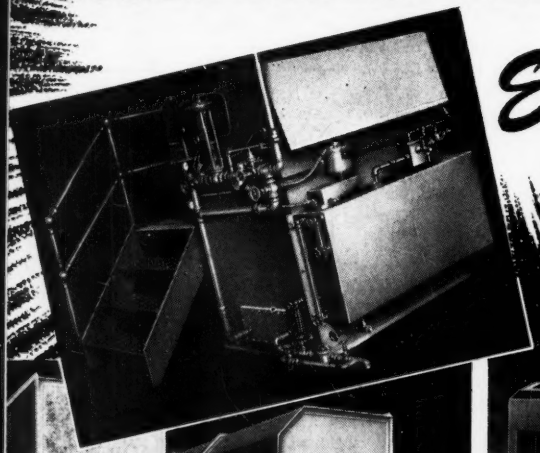
ZAPON DIVISION
ATLAS POWDER COMPANY

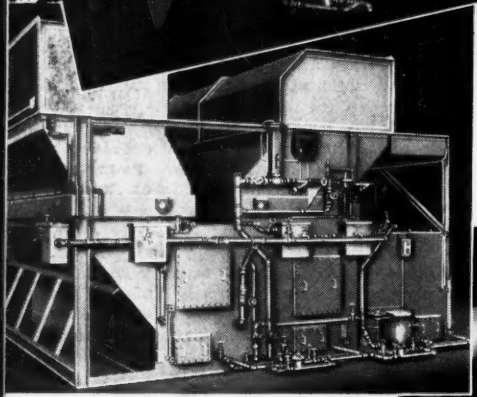
Ed. H. Buoy.

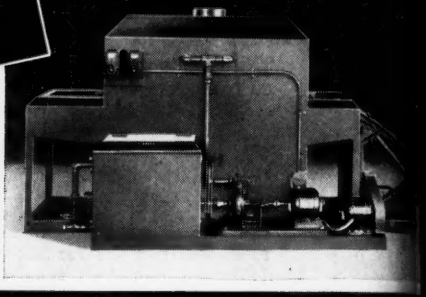
Ed. H. Buoy
Assistant General Manager

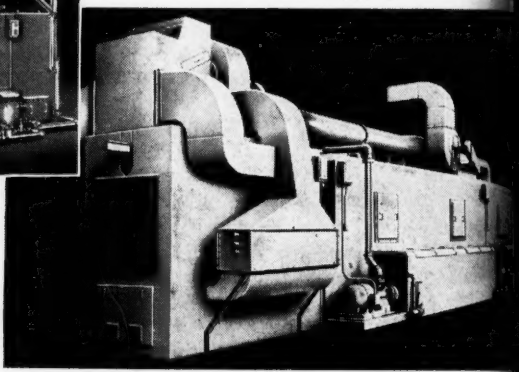
DETREX DEGREASERS and WASHERS

Engineered in SIZES and MODELS TO MEET Your









Detrex builds Solvent-vapor Degreasers ranging from small, hand-operated models up to the largest, fully conveyorized machines . . . Washers of the smallest single-stage designs up to conveyorized multi-stage machines with all auxiliary equipment.

Chemicals for efficient use in all types of metal cle ing machines and procedures are also supplied b Detrex. Write for literature.

DETREX CORPORATION

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INVEST IN OUR COUNTRY'S FUTURE—BUY WAR BONDS